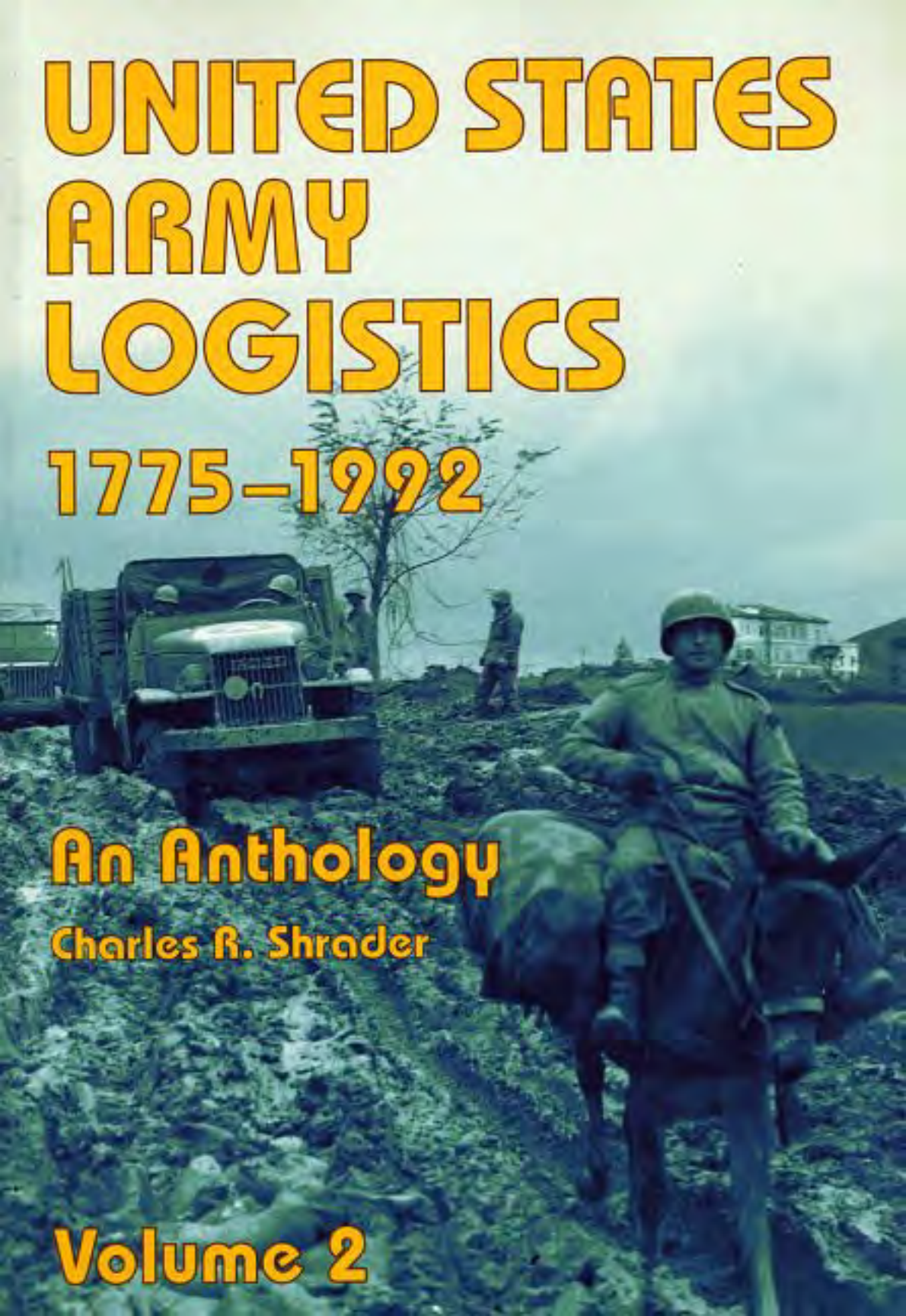
UNITED STATES ARMY LOGISTICS 1775–1992



An Anthology

Charles R. Shrader

Volume 2

United States Army Logistics, 1775–1992
An Anthology

Selected and Edited by

Charles R. Shrader

In Three Volumes
Volume 2



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Part IV

The Era of Specialization

Chapter 6

Logistics of the Spanish-American War

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Logistical Planning for the War with Spain

Introduction. In this excerpt from his excellent study of the United States Army in the Spanish-American War, historian Graham A. Cosmas describes the confusion within the higher echelons of the War Department in 1898 occasioned by the lack of a well-defined chain of command and clear lines of responsibility for logistical planning. He discusses the roles played by Secretary of War Russell A. Alger, Lt. Gen. Nelson Miles (the Commanding General of the Army), and Maj. Gen. Henry C. Corbin (the Adjutant General).

The staff bureaus were the special victims of diffused responsibility and control as well as of the repeated changes in military plans. Line officers and civilian policy makers alike treated the supply services as necessary nuisances and rarely consulted their chiefs before settling upon plans of mobilization or campaign. Neither the Quartermaster General nor the Chief of Ordnance received any advance notice of the call for 125,000 Volunteers or indeed of any details of the Army's mobilization. They had to contract for supplies on the basis of whatever rumors they could ferret out and on their own estimates of probable requirements. Troop movements and changes in campaign objectives during the war repeatedly caught the bureaus by surprise, in spite of pleas from their chiefs that they be warned in advance so they could have materials ready when and where needed. Time after time, the bureaus had to improvise transportation and equipment at the last moment, often without clear guidelines for action.[3]

Under established Army practice, troop commanders in camp and field were supposed to guide the bureaus' efforts by requisitioning the material they needed to carry out their assigned missions. Thus, in late June, when the Administration decided to send an army against Puerto Rico, Secretary Alger asked General Miles, who would lead the expedition, to estimate its supply and transportation

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requirements. If the commanders understood clearly their responsibilities and learned of them far enough in advance of the time for action, this system could work with rough efficiency, but too often in this particular war the field commanders lacked both information and time. The size and objectives of the Cuban expedition repeatedly changed, and so did its demands for shipping and equipment. In the home camps, disagreement over the functions of the various Army corps hindered supply efforts. General Miles regarded the corps as administrative formations for the instruction and equipment of regiments that were to be transferred to other commands when ready for combat, while corps commanders like Maj. Gen. John R. Brooke of the First at Chickamauga thought they were organizing field armies. The War Department never resolved this dispute. Corps commanders, as a result, maneuvered for front-line assignments, intrigued constantly for supplies and staff, and failed to equip their camps properly for long occupation.[4]

The confusion among the corps commanders reflected a fundamental administrative deficiency of the Army in 1898: the failure of the War Department to relate command assignments to the military tasks that had to be performed. Corps organizations, for instance, proved necessary and effective in controlling field forces in Cuba and the Philippines, but in the home camps they did little but tie up scarce generals and staff officers in superfluous headquarters organizations. For training and equipping troops under conditions that prevented all regiments being brought to battle readiness simultaneously, a series of divisional camps under the geographical departments would have required fewer administrative personnel and would have suffered less disruption when the War Department drew troops from them for field service. As it was, to reinforce the Santiago expedition in July and to invade Puerto Rico, General Miles found it necessary to organize a temporary army by taking from the First, Second, and Fourth corps their best-prepared units and many of their generals and staff officers. These inroads on personnel that could train and command raw recruits left the huge troop concentration at Chickamauga in an administrative state bordering on anarchy.[5]

Important jobs went unassigned. The War Department never placed a single general with adequate staff in charge of establishing an embarkation port for the Cuban expedition or of equipping a transport fleet. Nor did it place one officer in over-all supervision of the training camps. Instead, it left to each corps commander the problems of clothing, equipping, and training his own soldiers while Alger, Miles, Corbin, the bureau chiefs, and the department commanders all dabbled sporadically in every other phase of mobilization. Such maldistribution of authority and responsibility did as much as the absence of a general staff in Washington to prevent coherent planning and continuous supervision of the Army's war effort. Because of the resulting confusion, a postwar investigation concluded, "There was lacking in the general administration of the War Department . . . that complete grasp of the situation which was essential to the highest efficiency and discipline of the Army."[6]

Along with confusion in command, cumbersome procedures hindered the War Department's efforts. The supply bureaus labored under a system for making contracts and regulating funds that was designed to prevent fraud in peacetime rather than to assure swift action in wartime. Secretary Alger, used to simpler business

methods, "got very weary of the man legal obstructions." He declared on one occasion that he would pay for needed supplies himself if regulations prevented the quick use of government funds. The War Department's complicated filing system broke down under the flood of wartime reports and messages. Documents piled up in bureau offices where the clerks lacked the time to place them in the proper pigeonholes. Much of this excess paper resulted from the old Army evil of centralization. The bureau chiefs during the war rarely vetoed actions of their subordinates in the field, but they continued to channel most major decisions across their own desks. All contracts made by depot quartermasters, for example, had to come to Quartermaster General Ludington for final approval, even though he usually rubber-stamped the decisions made at the lower levels. Their failure to delegate authority left the bureau chiefs floundering in a mass of petty details, without leisure to consider matters of general policy or to anticipate future needs. Surgeon General Sternberg admitted after the war that he had "not had time to consider important questions which I should at times have given several hours to." Each of his colleagues could truthfully have made the same confession.[7]

Alger, Corbin, and the bureau chiefs worked hard to surmount the War Department's lack of an institutional brain and nervous system. Although he preferred to leave the bureau chiefs to their own devices, Alger met with them daily during the crisis of the war to coordinate their support of field operations. When he intervened directly in their work, it was usually to press for free spending, the suspension of hampering rules, and aggressive action.[8]

Alger also tried to anticipate future needs and to plan for meeting them, especially in the matter of selecting campsites and embarkation ports. The Army's first concentration points had been chosen by different people as mobilization progressed—Chickamauga and Tampa by the Army-Navy strategy board, Camp Alger by officers from General Miles's staff and the Quartermaster's Department, Jacksonville by troop commanders in Florida. San Francisco became a point of concentration and embarkation because the Army already had a large post there and because, as California's principal city, it was the assembly point for many of that state's Volunteers. Early in June, when it became apparent that the Caribbean expeditions and the Volunteer reserves would need more camping grounds and port facilities, Alger acted to bring order into the process of site selection. He sent four officers representing The Adjutant General's Office, the Quartermaster and Medical departments, and the Corps of Engineers on a tour of the South to examine and recommend concentration points. The officers' report, presented to Alger on June 14, analyzed the terrain, water supplies, climate, health conditions, railroad terminals, and—where they existed—the port facilities of Fernandina, Jacksonville, and Miami in Florida, Augusta, Brunswick, and Savannah in Georgia, and Charleston, Columbia, and Summerville in South Carolina. Its conclusions guided later troop movements.[9]

Partly because of his disagreement with the President's military decisions and partly because of clashes with Alger and the bureau chiefs, General Miles's authority within the War Department and the McKinley Administration steadily declined. His feuds within the War Department began early in April, when he col-

lided with the Chief of Ordnance over procurement and selection of weapons. Miles recommended extensive purchases of guns and ammunition abroad and demanded that the Krag-Jörgensen rifle be replaced with another weapon that had earlier been tested and rejected by an Army board. On the vehement urging of the Chief of Ordnance, Alger turned down Miles's proposals. At Miles's insistence, however, the Secretary spent over $200,000 for a trial order of 10,000 Winchester rifles that, when tested, failed to meet the Army's standards of performance. Miles continued his experiments in ordnance, and, as one result, he later burdened the Santiago expedition with 100 portable shields—massive steel plates on wheeled carriages that troops were supposed to push ahead of them in battle. The monsters, which weighed 1,000 pounds each, could not be used in the Cuban mud, and during the next several months were hauled from ship to warehouse and back again. Miles's advice on the selection of campsites proved to be both full of errors and eccentric. Repeatedly, he urged that troops be stationed at Miami, in spite of the fact that inspecting officers reported the terrain unsuitable and the water likely polluted. Eventually, at his insistence, a division spent a few weeks there, only to leave in haste after an outbreak of typhoid, probably caused by the bad water. Besides giving wrong-headed advice, Miles reopened the old conflict for supremacy between the Commanding General and the Secretary of War. He did so late in May, when Alger ordered him to make an inspection tour of the assembly camps. Storming into Alger's office, Miles angrily rejected the order and denied Alger's right to issue it. From then on, his relations with the Secretary deteriorated, along with his authority as a strategic adviser to the President.[10]

While Miles gradually lost his authority within the War Department, Adjutant General Corbin quietly enlarged his. Amid changing plans, conflicting orders, and clashing personalities, Corbin's calm, tact, physical endurance, and administrative efficiency held the creaking military machine on course. After the end of May, General Miles spent much of his time away from Washington, therefore, except for the actual direction of field operations, all the myriad details of army command fell upon Corbin. He supervised the recruitment and mobilization of Regulars and Volunteers and battled for full implementation of the progressive clauses of the Army legislation. He gave unified direction to the supply departments. Whenever a troop movement was ordered, he directed that copies of the order be sent at once to the bureaus. He received from the training camps daily reports on the stores available, on the number of articles issued, and on immediate additional requirements, and he referred these reports also to the bureaus for their guidance. After troops landed in Cuba, Puerto Rico, and the Philippines, he kept his office open twenty-four hours a day in order to maintain constant telegraphic communication with the expedition commanders and to pass on their reports, requisitions, and recommendations to the President and the Secretary of War. He largely controlled the assignment and transfer of officers, and field commanders praised him for putting able men in the right places. Insofar as anyone kept the press informed, he acted as public relations officer for the Army and won the respect of the Washington correspondents. He also earned the confidence of Congress. When its committees needed military information, they sent their inquiries to Corbin and received prompt, precise answers.[11]

Having lost confidence in both Alger and Miles, President McKinley began turning to Corbin for military advice and for assistance in implementing his policies. By late June he had made Corbin his *de facto* chief of staff. Everyone connected with the Administration testified to the importance of Corbin's role in the making and carrying out of policy. McKinley's postmaster-general later wrote:

> General Corbin was the distinctive soldier at Washington in whom the President had implicit confidence and who from the nature of his position and function could hold the relation of confidential adviser and executive. . . . He became the President's counsellor and adjutant. In all the work of organizing, planning and operating the President relied on his judgment and execution. They were in constant consultation. I have not infrequently called at the White House on some errand late at night, and found them conferring together. This was blended with his regular work as Adjutant General, but was beyond it. Much of his most important and valuable service was in giving the President the benefit of his knowledge and judgment, and in carrying out the President's wishes and commands through the proper channels, and his part had no record.

In July, Secretary Alger asked Congress to advance Corbin as well as all his successors in office to the rank of major general and thereby give formal recognition to The Adjutant General's role as chief of the staff. Congress failed to comply with the request, but Corbin continued to expand his power as acting commander of the Army.[12]

Alger and Corbin early began trying to liberate the War Department from the toils of its peacetime procedures. At the beginning of the war, Alger restored to corps and department commanders much of the administrative discretion taken from them by previous changes in the regulations. Throughout the conflict, he supported commanders who took initiative in promoting the welfare of their men or the success of their missions. Corbin, who transmitted to Alger and the bureaus the demands and complaints of line commanders, helped to speed and simplify the movement of supplies. Probably as a result of his influence, the bureau chiefs avoided their peacetime practice of countermanding or reducing field commanders' requisitions. Line officers later testified almost unanimously to the staff's cooperative attitude. In June, at the War Department's request, Congress allowed the Quartermaster and Ordnance bureaus to discard their cumbersome contract system when emergencies required rapid purchasing, and the bureaus took full advantage of their new freedom. Gradually, too, the Quartermaster and Medical departments enlarged the discretionary authority of their officers outside Washington by allowing them to purchase and issue supplies without clearing every transaction with the bureau chiefs.[13]

From Secretary Alger down, War Department officials worked hard and unselfishly to master the situation in which they found themselves. If they were at times misguided or unimaginative, they nevertheless served honorably; none used his post to enrich himself. Thanks to their efforts, the Army's central administration muddled through the crisis. Gradually, as the department emerged from the

initial confusion. its actions took on system and purpose. Through trial and error and often, as Corbin exemplified, through able men's simply looking around them and doing what was necessary, the early maldistribution of responsibilities was overcome. Perceptive officers undertook tasks as they came to their attention, and, as the Army's missions took on clearer definition, the War Department used its personnel more efficiently. Further, experience with large-scale operations improved the performance of officers at every point along the chain of command.

* * *

Although the months of May and June were for many soldiers a nightmare of mislaid requisitions, lost supplies, scarcities, delays, and discomfort, the confusion in Washington and in the camps gradually subsided. As production of military supplies increased, an ever larger stream of goods flowed into the assembly camps. The new staff officers, inexperienced as they were, proved eager to learn. Gradually they mastered their duties and thereby removed part of the administrative burden from the hard-pressed Regulars. Regimental administration slowly improved under the pressure of necessity, and with the aid of camp and field experience that was often painful. By mid-August, most of the regiments called out early in May were approaching battle readiness. Units that had assembled under the second call for Volunteers reported little trouble in obtaining clothing and equipment.[56]

Under the conditions prevailing in 1898, the organization, officering, and equipment within three months of even a stationary force of 275,000 men constituted a remarkable achievement for the War Department—and it was only one part of the dual task President McKinley had imposed on his straining military machine. At the same time the War Department was struggling with problems of supply and administration in the home camps, it launched and pressed to victory overseas campaigns on opposite sides of the world.

Notes

[3] *War Investigating Commission*, I, 510–11; III, 126–27; IV, 1240–41; VI, 2618, 2962; VII, 3139, 3149. *RSW, 1898*, IV, 14–15. Brig. Gen. D. W. Flagler to Secretary Alger, March 12, 1898, Alger Papers. J. F. Weston to Maj. Gen. James H. Wilson, April 29, May 6, and October 22, 1898, Box 26, Wilson Papers. Flagler to Adj. Gen. Corbin, July 20, 1898, File No. 103944; Memorandum from Office of the Chief of Ordnance, July, 17, 1898, File No. 105774, AGO Records. *Army and Navy Journal*, June 11, 1898.

[4] Secretary Alger to Maj. Gen. Miles, June 26, 1898, *Correspondence*, I, 268–69, asks for supply estimates for the Puerto Rican invasion. For material on the purposes of the corps, see: Miles to Alger, April 30, 1898, File No. 192302; Maj. Gen. J. R. Brooke to Adj. Gen. Corbin, June 8, 1898, File No. 215311; Brooke to Corbin, June 17, 1898, File No. 96332; Brig. Gen. Henry V. Boynton to C. A. Boynton, June 14, 1898, File No. 160115, AGO Records. Hugh L. Scott to Mrs. Scott, June 2, 1898, Box 1, Scott Papers. J. F. Weston to Maj. Gen. James H. Wilson, June 7, 1898, Box 26, Wilson Papers. *RSW, 1898*, I, 690–92.

[5] Secretary Alger to President McKinley, June 18, 1898, Alger Papers, and *Correspondence*, I, 519, illustrate the disruption of corps to obtain regiments for Puerto Rico.

[6] *War Investigating Commission*, I, 116.

[7] Alger describes his frustration at slow procedure, in Alger to Col. Curtis Guild, November 12, 1901, Alger Papers. *War Investigating Commission*, I, 113, 126; III, 332, 723; IV, 1133–34; V, 2185, 2317; VI, 2634, 2643, 2846, 2956. *RSW, 1898*, I, 585–86. Alger, *Spanish-American War*, 7–8. Carter, *General Staff*, 17, 33. Risch, *Quartermaster Corps*, 495–98. Lee, *JMSI*, XI, 537–38. *Army and Navy Journal*, October 1, 1898, denounces centralization in the War Department and blames it for wartime failures.

[8] *War Investigating Commission*, I, 120; VI, 2961; VII, 3293, 3761–63.

[9] For material on the selection of the first campsites, see: Alger, *Spanish-American War*, 411, 415. Asst. Adj. Gen. J. C. Gilmore, Endorsement on AGO File 73129, April 7, 1898, File No. 192302; Capt. A. S. Barker, USN, and Asst. Adj. Gen. A. L. Wagner, "Memorandum for the Honorable Secretary of War," April 4, 1898, File No. 198209, AGO Records. *Correspondence*, I, 7–8. *War Investigating Commission*, I, 209, 245, 248, 266; IV, 1258; V, 1965–66, 1978, 1980; VI, 2755–56; VII, 3261–62, 3273. Lt. Col. M. C. Martin to the Quartermaster General, August 31, 1898, File No. 115533, OQMG Records. *The New York Times*, May 16, 1898. For the appointment, work, and report of Alger's campsite board, see the following: *War Investigating Commission*, VII, 3361–71. File No. 121918, AGO Records. *The New York Times*, June 9 and 15, 1898.

[10] Chief of Ordnance D. W. Flagler to Secretary Alger, April 8 and 12, May 2, 1898; Maj. Gen. Miles to Alger, April 18, 1898; Acting Chief of Ordnance to Adj. Gen. Corbin, March 30, 1899; Chief of Ordnance A. R. Buffington to Alger, April 10 1899; Alger to W. M. Laffan, June 29, 1900, to Corbin, November 19, 1900, and to Senator George F. Hoar, February 8, 1900, Alger Papers. H. V. Boynton to Brig. Gen. James H. Wilson, May 24, 1899, Box 4; J. F. Weston to Wilson, November 11 1898, Box 26, Wilson Papers. Miles to Alger, May 25, 1898, File No. 85540; Miles to Alger, June 18, 1898, File No. 94797; Asst. Adj. Gen. J. C. Gilmore to Corbin, May 14, 1898, Maj. Gen. J. F. Wade to Corbin, May 17, 1898, Corbin to Maj. Gen. W. R. Shafter, May 25, 1898, File No. 121918; Miles to Secretary Alger, May 16, 1898, File No. 192302, AGO Records. *Correspondence*, I, 70–71; II, 681–82. *War Investigating Commission*, VII, 3767–68. Alger, *Spanish-American War*, 57–59. Johnson, *Unregimented General*, 317.

[11] *War Investigating Commission*, I, 119; VI, 2848; VII, 3293–94. *Correspondence*, I, 119. For an example of Corbin's coordination of the bureaus, see Memorandum Assigning Volunteers to Camps, May 15, 1898, File No. 80916, AGO Records. Gen. Henry W. Lawton to Adj. Gen. Corbin, November 8, 1898, Box 1A; John D. Long to Secretary of War Elihu Root, July 21, 1903, Thomas H. Carter to Root, August 1, 1903, John W. Griggs to Root, August 10, 1903, Francis E. Warren to Root, September 13, 1903, *The New York Times*, October 24, 1909, clipping, Box 8; *Nebraska State Journal*, May 1, 1898, and *The Mail and Express Illustrated Saturday Magazine*, June 25, 1898, both clippings in 1898 Scrapbook, Box 10, Corbin Papers. Brig. Gen. James H. Wilson to

Commissary General John F. Weston, July 18, 1899, Box 44, Wilson Papers. Dunn, *Harrison to Harding*, I, 251–52.

[12] The quotation is from Charles Emory Smith to Secretary of War Elihu Root, August 12, 1903, Box 8, Corbin Papers. Grenville M. Dodge to "Dear Horton," September 8, 1909, C. H. Grosvenor to Mrs. Edyth P. Corbin, September 11, 1909, Edgar S. Dudley to Lt. Gen. H. C. Corbin, September 19, 1906, F. V. Greene to Col. H. H. Sargent, October 27, 1909, Box 1A; J. A. T. Hull to Root, August 14, 1903, John W. Griggs to Root, August 10, 1903, James Wilson to Root, August 14, 1903, Francis E. Warren to Root, September 13, 1903, Box 8, Corbin Papers. In order to fill out the historical record, Root collected testimonials to Corbin's role from many officials of McKinley's government. By mid-June, Corbin had established himself in the President's confidence. See John J. McCook to Maj. Gen. James H. Wilson, June 20, 1898, Box 15, Wilson Papers. *Army and Navy Journal*, August 27, 1898, and February 25, 1899. For material on the effort to make Corbin and his successors major generals, see *Memorandum of the Military Service of Brig. Gen. Henry C. Corbin* (Pamphlet, 1900), 18–21, Box 7, Corbin Papers.

[13] *War Investigating Commission*, I, 685; III, 141–42, 240, 255–56, 310, 337–38; IV, 845–46, 851–52, 984–86, 1259; VI, 3110; VII, 3299, 3325. *RSW, 1898*, I, 13; IV, 245–46. GO 66, HQA, June 9, 1898, *GO/AGO, 1898*. Risch, *Quartermaster Corps*, 517–19, 525. Chief Q. M. Guy Howard to the Quartermaster General, September 20, 1898, and Lt. Col. J. B. Bellinger, Report of the Quartermaster Depot at Tampa, May 18–August 31, 1898 (hereafter cited as Bellinger, Tampa Report), both in File No. 115533, OQMG Records. Maj. Gen. J. R. Brooke to Adj. Gen. Corbin, April 23, 1898, and Corbin to Brooke, April 25, 1898, File No. 75583; Corbin to Brooke, June 7, 1898, File No. 87702; Brig. Gen. L. A. Carpenter to Corbin, September 10, 1898, File No. 147555, AGO Records. *Army and Navy Journal*, April 23, 1898. *The New York Times*, May 22, June 4 and 5, 1898.

[56] *War Investigating Commission*, I, 133; III, 233, 663–64; IV, 936–37, 956, 962, 1110, 1240; VI, 2960, 3100; VII, 3142, 3283, 3297–98. *RSW, 1898*, II, 221. Brig. Gen. Robert Hall to Adjutant General, 2nd Division, IV Corps, September 10, 1898, Lt. Col. M. W. Day to Adjutant General, IV Corps, September 12, 1898, Brig. Gen. James R. Lincoln to Adj. Gen. Corbin, September 12, 1898, Lt. Col. S. M. Whiteside to Adjutant General, IV Corps, September 23, 1898, Brig. Gen. J. K. Hudson to Adjutant General, 2nd Division, IV Corps, September 15, 1898, File No, 147555; Maj. Gen. J. F. Wade to Corbin, July 19, 1898, File No. 159902, AGO Records. Col. W. T. Patten to the Quartermaster General, August 16, 1898, File No. 115533, OQMG Records. Col. Colson to Brig. Gen. Sanger, September 9, 1898, Box 7, Scott Papers. Bigelow, *Santiago Campaign*, 10–11. *The New York Times*, June 12 and 19, 1898.

34

The Dodge Commission Assesses the Work of the Quartermaster Department in the War with Spain

Introduction. In this extract from their report to the President the members of the Dodge Commission present a summary of their findings regarding rail, water, and land transportation support provided by the Quartermaster General during the War with Spain. Operations in the United States, Cuba, Puerto Rico, and the Philippines are addressed. The Dodge Commission report was the basis for substantial change in the Army logistical system (note the final paragraph), but the problems noted still face the Army today.

Railroads.

No arrangements were made for the movements of regiments by railroad for field duty previous to April 1.

On May 8 the Quartermaster-General, in anticipation of the transfer of large bodies of troops, notified the officers of his department of the proposed movements, and directed them to make proper arrangements with the railroad officials, so that the troops might be moved with comfort and celerity. These officers appear to have acted with zeal in obtaining rates, in many cases very advantageous to the Government. When extended journeys covering night travel were to be made, tourists' cars were obtained wherever possible, and when these could not be obtained the contracts provided that each soldier should have a double seat.

The Quartermaster-General reports that in making these movements the rates generally did not exceed 1½ cents per mile for passengers in many cases being less.

There were transported by rail between April 1 and the breaking up of Camp Wikoff, early in November, 17,863 officers and 435,569 enlisted men.

Reproduced from *The Report of the Commission Appointed by the President to Investigate the Conduct of the War Department in the War with Spain*, U.S. Senate Document no. 221, 56th Cong., 1st sess., 8 vols. (Washington, D.C.: Government Printing Office, 1900), 1: 132–38 and 146–48.

Many complaints were made in reference to unnecessary delays and lack of promptness on the part of the Quartermaster's Department in moving regiments and in the care of sick and convalescents returning home either with their regiments or alone.

Col. H. L. Turner, of the First Illinois Volunteer Infantry, states that his experience was terrible when he removed his regiment from Montauk to Chicago, the suffering of the sick having been intense, greatly owing to the delay of one railroad company in having proper cars ready for his command.

In explanation of this delay it is stated that a mistake was made by the commanding general of the camp at Montauk in ordering the regiment to be in readiness to embark twenty-four hours in advance of the time indicated by the chief quartermaster in New York City.

Vast quantities of freight were handled and sent to the camps at Chickamauga, Jacksonville, Fernandina, Miami; Dunn-Loring, Va. (Camp Alger); Camp Meade, Pennsylvania; Camp Wikoff, Montauk Point, and to the camps at Anniston, Huntsville, Knoxville, Lexington, Tampa, and other localities throughout the South.

Great complaint was made of the railroad congestion at Tampa and the absolute lack of ability to bring order out of chaos at that place during the early part of the period of its occupancy by troops. The Major-General Commanding has stated that supplies for 70,000 men for 90 days were ordered there, and the confusion on the railroad when he reached Tampa was very great, 1,000 cars being sidetracked, some of them as far back as Columbia, S.C.

It is stated that in the hurry and rush attending the commencement of this work the contents of cars were unknown at Tampa; that bills of lading were not forwarded, and that it seemed impossible for a time to determine where absolutely necessary articles were located.

Colonel Bird, of the Quartermaster's Department, testifies that this was corrected later on, when the contents of cars were clearly marked upon them and bills of lading promptly forwarded.

The condition of the railroad congestion during the early portion of the time Tampa was occupied by troops seems unparalleled, showing an almost inexcusable lack of executive ability on the part of those charged with the loading, unloading, and handling of the trains.

Colonel Bird and General Humphrey testify that there were very poor facilities for transferring troops and supplies arriving at Tampa via the Florida Central Railroad to the Plant System leading direct to Port Tampa.

Order was finally brought out of chaos, the cars unloaded, the congestion overcome, and a vast amount of supplies of every character delivered at this immense encampment.

Congestion also occurred at Chickamauga Park, probably with not so serious results as at Tampa, but complaint was made that materials of different classes, belonging to different departments, were frequently packed in the same car, rendering it necessary to remove large packages of quartermaster's or commissary stores in order to obtain the smaller packages of medicines and medical supplies.

There was also congestion and confusion in connection with the railroad facilities between the 5th and 15th of August at Camp Wikoff, caused by the side tracks being in such condition that they could not be used. Cars in switching would get off the track and cause blockades for hours; troops and animals came by rail from Long Island City more rapidly than they could be unloaded and cared for at Montauk. By the middle of August the side tracks were in order and necessary storehouses made available for supplies. The railroad between Montauk and Long Island City was evidently worked to its maximum capacity.

Water Transportation.

For more than half a century it had not been necessary for the United States to send large bodies of troops by sea for the invasion of a foreign country, but in May, 1898, the Quartermaster's Department was suddenly called upon to prepare for work of this important character.

The Quartermaster-General reports that the needs of his department for the transportation of troops and supplies by sea were canvassed prior to April 1, 1898, and measures taken to ascertain the best method for providing such transportation.

On March 24, the Quartermaster-General directed the depot quartermaster in New York to report at once all available vessels of the coastline steamship companies that could be obtained by charter, and to state their capacity, etc. The reply reached him on March 29, furnishing the desired information, but adding that a member of the board on auxiliary cruisers had stated that the Navy had absolute option on all boats of the most prominent steamship companies.

The testimony before the commission shows that between April 1 and August 31, 44 steamships were chartered and 14 purchased for service on the Atlantic and Gulf waters; that 17 were chartered and 2 purchased for service on the Pacific Ocean, and that all were fitted up, to a certain extent, for the transportation of troops, animals, and supplies. While complaints have been made as to the character of the equipment of the vessels used on the Atlantic, the reports from those on the Pacific show them to have been arranged as satisfactorily as was possible.

The steamship *John Englis* was also purchased, at a cost of $450,000, for the use of the Medical Department, and after some delay was refitted as a hospital ship, at a cost of $136,851.11, and renamed the *Relief*. The total tonnage of the ships used as transports on the Atlantic coast was 166,987 tons, and the Quartermaster General reports that they were fitted up for the accommodation of 40,723 officers and men.

The total tonnage of the ships on the Pacific coast was 61,287 tons, and they were reported as having been arranged so as to accommodate 18,120 officers and men.

The records of the Quartermaster's Department show that troops and civilian employees were transported by sea between April 1 and September 15, 1898, as follows:

	Men.
To Cuba	28,195
To Porto Rico	17,460
To Manila	16,405
To Honolulu	629
Returned from Cuba	21,686
Returned from Porto Rico	5,541
Civilian employees transported	2,920
Total	92,836

The testimony shows that the first call upon the Quartermaster's Department was for ships to transport 5,000 men to Cuba, and that soon after the call was increased and demand made for steamers to transport 25,000.

The fleet of transports concentrated at Port Tampa, Fla., for transportation of these 25,000 men to Cuba consisted of 38 vessels, and included 2 water boats, 3 steam lighters, 1 collier, 1 tug, and 2 decked barges. Upon loading these vessels it was found that their capacity had been largely overrated, and it was impossible to carry upon them, without great discomfort and danger, more than 16,000 men, with their equipments, artillery, ammunition, subsistence, medical supplies, and 2,295 animals, for a voyage of 1,000 miles. Even with this reduction the vessels appear to have been crowded.

In spite of the efforts of the Quartermaster's Department many of these vessels were poorly equipped with sleeping accommodations; the sinks in many instances were inconvenient and insufficient, and some of the vessels were badly ventilated and filled with disagreeable odors. It has been stated that had the fleet encountered a severe storm while en route for Cuba the discomfort would have been intense and there might have been loss of life. The Quartermaster's Department ought to have been able to more thoroughly equip these vessels, and surely it should have been more certain of their carrying capacity. A sufficient number of vessels for transporting 25,000 men, with the required lighters for their disembarkation, should have been promptly furnished, even had such action rendered necessary the seizure of every steamer on the Atlantic and Gulf coasts sailing under the American flag.

Testimony shows that the vessels were not loaded systematically. A battery with its guns and horses would be placed on one vessel and its ammunition on another. The Second, Seventh, and Seventeenth Regular Infantry were each divided up and portions in each case sent on three different vessels.

The Quartermaster-General reports that pontoons were taken for use in landing in coves and in still water when possible; that urgent but unavailing efforts were made to procure lighters for purposes of disembarkation; that three steam lighters were chartered at Galveston and one ocean tug at Mobile and sent to Port Tampa to accompany the Santiago expedition, and that two decked barges were purchased at Tampa for the same purpose.

A seagoing tug with three barges started from Mobile for Cuba; another with two barges started from New Orleans for the same destination, but all of these barges, except one, were lost, and only one of the tugs reached Santiago. One tug was reported as having broken down or left the fleet while en route for Santiago.

The fleet of transports arrived safely at Daiquiri, but the failure to provide a full and sufficient number of lighters for disembarkation of troops, supplies, and artillery caused delay, anxiety, annoyance, and danger, and had there been serious storms, or had the landing been opposed by a vigilant and well-trained force of the enemy, the result might have been far different.

Finally, the Quartermaster's Department entered into contract with a New York firm to fit out an expedition with a large force of mechanics and laborers, with necessary materials, machinery, pile drivers, and implements for construction of docks and railways. The Quartermaster-General reports that this outfit proceeded to Santiago, Cuba, and thence to Ponce, Porto Rico, where its services were of much assistance to the Army.

The testimony shows that in the transportation of the Spanish prisoners from Santiago to Spain the interests of the General Government received the most ample protection; that proposals were invited; that every effort was made to procure proper vessels, to provide for the care and comfort of the men, and that the cost of transportation by the Spanish Trans-Atlantic Company was at the rate of $55 each for officers and $20 each for enlisted men. The first proposal of the company was at the rate of $60 and $30, respectively, but they finally reduced their demands, so that the total price paid was over $200,000 less than the original offer.

The contract required that at the price named the company should furnish subsistence and medical attendance and practically care for these prisoners from the time of their embarkation until landed in Spain. The total numbers of persons transported was 22,864, at a cost of $513,860.

The purchase of transports by the department showed an equal effort to guard the interests of the General Government, and the testimony is to the effect that the purchase of these vessels was made direct either with the owners or their agents; that the prices were reasonable, and neither fees nor allowances were granted by the Government officials or paid by the Government to so-called middlemen.

The following vessels were purchased for use on the Atlantic and Gulf coasts:

Name of vessel.	Tonnage.	Cost.	Class.	Carrying capacity.		
				Officers.	Men.	Animals.
Panama, No. 1	2,085	$41,000	Freighter	10	400	.....
Port Victor, No. 2	2,792	175,000	... do ...	25	400	.....
Rita, No. 3	2,194	125,000	... do ...	15	700	.....
Mohawk, No. 20	5,658	660,000	Combination	80	1,000	1,000
Mobile, No. 21	5,780	660,000	... do ...	80	1,000	1,000
Massachusetts, No. 22	5,673	660,000	... do ...	80	1,000	1,000
Manitoba, No. 23	5,673	660,000	... do ...	80	1,000	1,000
Minnewaska, No. 24	5,796	660,000	... do ...	100	1,200	1,000
Mississippi, No. 25	3,732	350,000	... do ...	40	800	800
Michigan, No. 26	3,722	350,000	... do ...	40	800	800
Roumanian, No. 27	4,126	240,000	... do ...	45	1,100	50
Obdam, No. 30	3,656	250,000	Troop ship	50	1,300	100
Berlin, No. 31	5,641	400,000	... do ...	75	2,000	.....
Chester, No. 32	4,770	200,000	... do ...	.....	.....	.....
Total	61,298	5,431,000	.....	720	12,700	6,750

Eight of these vessels were provided with refrigerators for the transportation of fresh meat, seven of them having a capacity of 1,000 tons each. Two, the *Panama* and the *Rita*, were captured by the Navy, and were purchased by the Quartermaster's Department after having been condemned as prizes by the proper courts and offered for sale.

All of these were merchant vessels, and were temporarily fitted up as army transports to meet the urgent demands of the service, for which purpose an expenditure of $178,018.37 was made.

For use in the Pacific Ocean the following steamships were purchased:

Name of vessel.	Tonnage.	Cost.	Carrying capacity (men).
Scandia	4,253	$200,000	1,500
Arizona	5,000	600,000	1,700

The *Scandia* was fitted out as a hospital ship and the *Arizona* for the transportation of troops and supplies to Honolulu and Manila. Serious complaints were made in reference to the condition of the *Chester*, upon which the First United States Volunteer Engineers were transported to Porto Rico, and of the *Berlin* when it was loaded at New Orleans with the First United States Volunteer immunes.

It was stated that when the Sixth Massachusetts Volunteers were taken to Porto Rico on the United States naval vessel *Yale* they were subjected to discomfort and abuse. The testimony before the commission does not sustain this charge, but shows that the discomforts were no greater than might have been anticipated for any troops making such a trip under similar circumstances.

Transports for Porto Rico.

The first troops for the Porto Rican campaign sailed on the war vessel *Yale* from Guantanamo, Cuba, under the Commanding General of the Army, on July 21, and landed at Guanica, Porto Rico, July 25; from that date until August 26 forty transports arrived at the island, loaded with troops, munitions of war, and supplies.

In addition to these, the *Gypsum King* arrived August 10, towing three large lighters or barges consigned to Messrs. Van Aiken & Co., contractors, and loaded with lumber, bridge timber, railroad iron, coal, and other supplies, and a steam tug. The latter was transferred to the Quartermaster's Department, and was of great assistance in towing lighters to and from the transports to shallow water, in which they could be pulled to the docks.

The loading of some of these transports exhibited carelessness, and in several instances important supplies intended for the army of General Shafter were found upon them.

Thirty-six vessels arrived at Porto Rico without invoices to show their contents, causing much confusion and requiring the overhauling of the entire cargo in order to learn the contents of the ship. The first invoice was received with cargo

No. 37, that of the *Alamo*, which left Newport News, Va., on August 9 and reached Ponce on August 16. After that date regular invoices accompanied each vessel.

The first steam launch supplied by the Quartermaster's Department arrived on the *Rita*, which sailed from Tampa August 15, and reached Ponce August 23.

Gen. James H. Wilson, United States Volunteers, testifies that his command, while en route for Porto Rico, was delayed two weeks in Charleston, S. C., by failure of the transports to arrive, and that when he reached Ponce the disembarkation of the troops and materials was delayed by lack of landing facilities, so that ten days were required for a work that should have been accomplished in two days had there been proper steam tugs, launches, etc., available.

The Manila Expedition.

Major-General Merritt testifies that the transports used on the Pacific Ocean for conveying troops to Manila were carefully inspected by the Quartermaster's Department; that every possible change that was necessary was made, and that the vessels reached their destination without severe sickness among the troops or serious annoyance of any kind.

The first expedition for Manila sailed from San Francisco, Cal., on May 25, under command of General Anderson, with 2,491 officers and men, upon three steamships, *City of Sydney*, *Australia*, and *City of Peking*.

The second expedition, under command of General Greene, with 3,586 officers and men, sailed on June 15 on the steamships *China*, *Colon*, and *Zealandia*.

The third expedition, under command of General Merritt, with the command of General MacArthur, consisting of 4,847 officers and men, sailed on June 25, 27, 28, and 29 on the steamships *Senator*, *Morgan City*, *City of Para*, *Indiana*, *Ohio*, *Valencia*, and *Newport*.

The fourth expedition, under command of Gen. Elwell S. Otis, with 1,682 officers and men, sailed July 15 on the steamships *Peru* and *City of Puebla*, followed on July 19 by the steamship *Pennsylvania*, with 1,348 officers and men.

The last expedition, under command of Gen. H. G. Otis, sailed on July 23 and 29 on the steamships *City of Rio de Janeiro* and *St. Paul*, with 1,735 officers and men.

These vessels arrived safely at Manila, and the reports show that as a rule the health of the men was maintained during the long voyage of over 7,000 miles.

The sailing ship *Tacoma*, with 30 enlisted men, 19 civilian teamsters, 210 horses and mules, 44 wagons and ambulances, and six months' supply of subsistence and forage, sailed from San Francisco on August 6. On August 21 the steamship *Arizona*, with 490 officers and men and 4 women nurses on board, sailed from San Francisco, and on August 29 the steamship *Scandia* sailed with troops for Honolulu and 173 officers and men for Manila.

The entire movements show that transportation was furnished from San Francisco to Manila for 16,405 persons, with their equipments and supplies.

* * *

Land Transportation of the Command During The Santiago Campaign

Owing to the lack of necessary transports, the means of land transportation during the Santiago campaign was painfully deficient.

The testimony shows that the entire number of animals, wagons, and ambulances shipped with the expedition from Tampa and Mobile was as follows:

Government horses	578
Private horses	381
Pack and draft mules	1,336
Wagons from Tampa	114
Ambulances from Tampa and Mobile	7
Wagons from Mobile	84

General Shafter testifies that he could carry no more on his transports from Tampa; that he realized that he would have very few ambulances, but that wagons could be used or transportation both of the wounded and of supplies, while ambulances could be employed only for one purpose. General Humphrey testifies that no more land transportation was taken simply because the vessels were fully loaded. Lieut. J. M. Kennedy, assistant surgeon, appeared at the front near Santiago July 2 with ten ambulances, which had been brought over on the *Louisiana*.

There were eight pack trains, consisting in all of 580 mules, and the value of their services in carrying provisions and ammunition to the front was simply inestimable.

The testimony shows that the transports arrived off the south coast of Cuba near Santiago on June 21; that the pack trains were landed on June 22; that the first wagons were landed on June 25, and that the landing of the latter was continued more rapidly than they could be set up on shore, and that in fact some of those that were landed were never set up at all.

General Chaffee testifies that on July 1, at the battle of El Caney, ten days after the arrival of the fleet, there were no ambulances or wagons available, and that the roads were so horrible that they could not reach the front. He adds that only litters could have been used for the wounded, but even these were not on hand, as owing to oversight none had been landed.

It is plainly evident that this army of 17,000 men disembarked in the face of an enemy in a hostile country, and, rapidly thrown forward against a well-armed force, was painfully deficient in land transportation, but in spite of the absence of this almost absolutely necessary portion of the equipment of a well-trained command, it drove the enemy before it, captured their outposts, pushed them behind their main defenses, drove their fleet from Santiago Bay to absolute destruction as it faced the Navy of our country, and finally, after most gallant fighting under a tropical sun, amidst most adverse conditions, captured a strongly fortified city, and received as prisoners of war over 23,000 Spanish soldiers.

In addition to its military operations, it performed a work which neither its commander nor others ever imagined would devolve upon it—that of feeding, at

least to a limited degree, the vast host of men, women, and children who fled from Santiago on account of the fear of its bombardment, and, passing through our lines, sought refuge in El Caney; for days nearly as many rations were issued to these refugees is to the army itself, thus taxing the land transportation to its utmost limit.

The conclusions drawn from the foregoing are as follows:

1. The Quartermaster's Department, a month before war was declared, was neither physically nor financially prepared for the tremendous labor of suddenly equipping and transporting an army over ten times the size of the Regular Army of the United States.

2. That the department devoted the ability, zeal, and industry of its officers to accomplish the herculean task before it so soon as funds were made available and war was declared.

3. That it deserves credit for the great work accomplished, for the immense quantity of materials obtained and issued within so short a period, and for its earnest efforts in reference to railroad transportation and in protecting the great interests of the General Government committed to its charge. Its officers, especially those at the headquarters of the department and at its depots, worked earnestly and laboriously day and night, sparing themselves in no possible way.

4. There appears to have been a lack of system, whereby, even as late as October, troops in camps and in the field were lacking in some articles of clothing, camp and garrison equipage; and hospitals, at least at two important localities in the South—Fort Monroe, Va., and Huntsville, Ala.— lacked stoves, while at Huntsville fuel was wanting.

5. There appears to have been lack of executive or administrative ability, either on the part of the Quartermaster's Department or the railroad officials, in preventing the great congestion of cars at Tampa and Chickamauga when these camps were first established, which congestion caused delay, annoyance, and discomfort to the large bodies of troops concentrating at those places.

6. There appears to have been a lack of foresight in preparing and promptly having available at some central locality on the seacoast the necessary fleet of transports which it seemed evident would be required for the movement of troops to a foreign shore, and, finally, when the call came suddenly and the emergency was supreme, the department appears not to have fully comprehended the capacity of the fleet under its command; not to have supplied it with a complete outfit of lighters for the immediate disembarkation of troops and supplies; to have accepted without full investigation the statement that the vessels were capable of transporting 25,000 men, while really they could not and did not transport more than 17,000 with their artillery, equipments, ammunition, and supplies, and lacked sufficient storage room for the necessary amount of wagon transportation—that very important element in the movement of an army in the face of an enemy.

7. The Quartermaster's Department should maintain on hand at all times a complete supply for at least four months for an army of 100,000 men of all articles of clothing, camp and garrison equipage, and other quartermaster's supplies which will not deteriorate by storage or which can not at once be obtained in open market.

Finally. In the opinion of this commission, there should be a division of the labor now devolving upon the Quartermaster's Department.

Whether there should be one great department of supply, covering the Quartermaster's Department except transportation, the Subsistence Department, and the Pay Department, and another covering the important problem of transportation, including the movement of armies by land and by sea and the supply of animals, wagons, ambulances, and harness, is a subject for the serious consideration of a board of officers whose experience in peace and war, at home and in an enemy's country, would render them most competent to make an exhaustive investigation and to present a complete report upon this important subject.

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Official Allowances for Supplies, Equipment, and Transport, 1898

Introduction. Army General Orders No. 54, dated May 25, 1898, prescribed the standard allowances for supplies, equipment, and transport for field service during the Spanish-American War of 1898. As always, the standards were more often breached than observed in 1898.

GENERAL ORDERS

No. 54.

HEADQUARTERS OF THE ARMY,
ADJUTANT-GENERAL'S OFFICE,
Washington, May 25, 1898.

The following standard of supplies and equipment for field service is published for the information and guidance of troops in the military service of the United States. The allowance is regarded as the minimum for field service:

Headquarters of an army corps.—Three wagons for baggage, etc., or 8 pack mules; 1 two-horse wagon; 1 two-horse spring wagon; 10 extra saddle horses for contingent wants; 2 wall tents for commanding general; 1 wall tent for every two officers of his staff.

Headquarters of a division.—Two wagons for baggage, etc., or 5 pack mules; 1 two-horse spring wagon; 1 two-horse wagon; 5 extra saddle horses for contingent wants; 1 wall tent for commanding general; 1 wall tent for every two officers of his staff.

Headquarters of a brigade.—One wagon for baggage, or 5 pack mules; 1 two-horse spring wagon; 2 extra saddle horses for contingent wants; 1 wall tent for the commanding general; 1 wall tent for every two officers of his staff.

Allowance of transportation for regiment of cavalry, 49 wagons or 144 pack animals.

Allowance of transportation for battery light artillery, 4 wagons.

Allowance of transportation for regiment of infantry, 25 wagons.

Reproduced from the *Annual Report of the Major-General Commanding the Army to the Secretary of War, 1898* (Washington, D.C.: Government Printing Office, 1898), pp. 513–14.

Supplies to be carried in wagons per company: Ten days' field rations per man; 100 rounds of ammunition per soldier; 250 pounds of officers' baggage and supplies; tentage; grain for animals; utensils for each company mess, not to exceed 350 pounds for each troop, battery, or company; horseshoes, nails, tools, and medicines for cavalry horses, not to exceed 300 pounds; to each soldier or civilian employee (compactly rolled in one piece of shelter tent), 1 blanket, 1 poncho, and 1 extra suit of under-garments.

Whenever the amount of rations or grain varies from the above, the weight to be carried per 6-mule wagon may be increased or diminished, but should not exceed 4,000 pounds, and for 4-mule wagon 3,000, and, if possible, should be less per wagon.

Whenever obtainable on line of march, full forage will be allowed all animals, the rate of purchase to be regulated by the Quartermaster's Department.

To be carried on the person or horse: One overcoat, 1 piece of shelter tent, 50 rounds of rifle or carbine, and 24 rounds of revolver ammunition per soldier.

Supplies to be carried on pack mules for one troop of cavalry: Five days' field rations per man; 100 rounds of ammunition per soldier.

The utensils for each troop of cavalry must not exceed 350 pounds.

The weight of load per aperejo must never exceed 250 pounds, and should, if possible, be less than 200 pounds.

Troop of cavalry, company of infantry, or light battery.

	Troop of cavalry.	Company of infantry.	Light battery.
	Pounds.	*Pounds.*	*Pounds.*
Field rations, 10 days: Cavalry, 100 men; infantry, 106; artillery, 125	3,640	3,858	4,550
Ammunition, 100 rounds: Cavalry, 100 men; infantry, 106 men	725	769	....
Officers' baggage and supplies	250	250	250
Tentage (7 conical wall for cavalry and infantry, each; 9 for light battery)	854	854	1,098
Grain for animals, 10 days, 6 lbs.: Cavalry, 115; infantry, 12; artillery, 126	6,900	720	7,560
Utensils for each company mess	350	350	350
Horseshoes, nails, tools, and medicines for cavalry and artillery horses	300	....	325
Soldiers' baggage: Each 1 blanket, 1 poncho, 1 extra suit of under-garments, and 1 piece shelter tent	1,662	1,761	2,078
Total	14,681	8,562	16,211

By command of Major-General Miles:

H. C. CORBIN, *Adjutant-General.*

36

The V Corps Embarks at Tampa

Introduction. In this brief excerpt from his book on the Cuban campaign of 1898 George Kennan, a well-known newspaper reporter of the time (and distant cousin of the later U.S. diplomat of the same name), presents an eye-witness account of the assembly and embarkation of the V Corps at Tampa en route to Cuba.

It is hard to say exactly where the responsibility should lie for the long delay in the embarkation and despatch of General Shafter's expedition. When I passed through Tampa on my way south in June, the two railroad companies there were blaming each other, as well as the quartermaster's department, for the existing blockade of unloaded cars, while army officers declared that the railroad companies were unable to handle promptly and satisfactorily the large quantity of supplies brought there for the expedition. Naval authorities said that they had to wait for the army, while army officers maintained that they were all ready to start, but were stopped and delayed by reports of Spanish war-ships brought in by scouting-vessels of the navy.

That there was unnecessary delay, as well as great confusion and disorder, there seems to be no doubt. As one competent army officer said to me, in terse but slangy English, "The fact of the matter is, they simply got all balled up, and although they worked hard, they worked without any definite, well-understood plan of operations."

The principal trouble seemed to be in the commissary and quartermaster's departments. Many of the officers in these departments were young and inexperienced; army supplies from the North came down in immense quantities on two lines of railway and without proper invoices or bills of lading; it was often utterly impossible to ascertain in which, out of a hundred cars, certain articles of equipment or subsistence were to be found; and there was a lack everywhere of cool, trained, experienced supervision and direction. It was the business of some one somewhere to see that every car-load of supplies shipped to Tampa was accompanied by an invoice or bill of lading, so that the chief commissary at the point of

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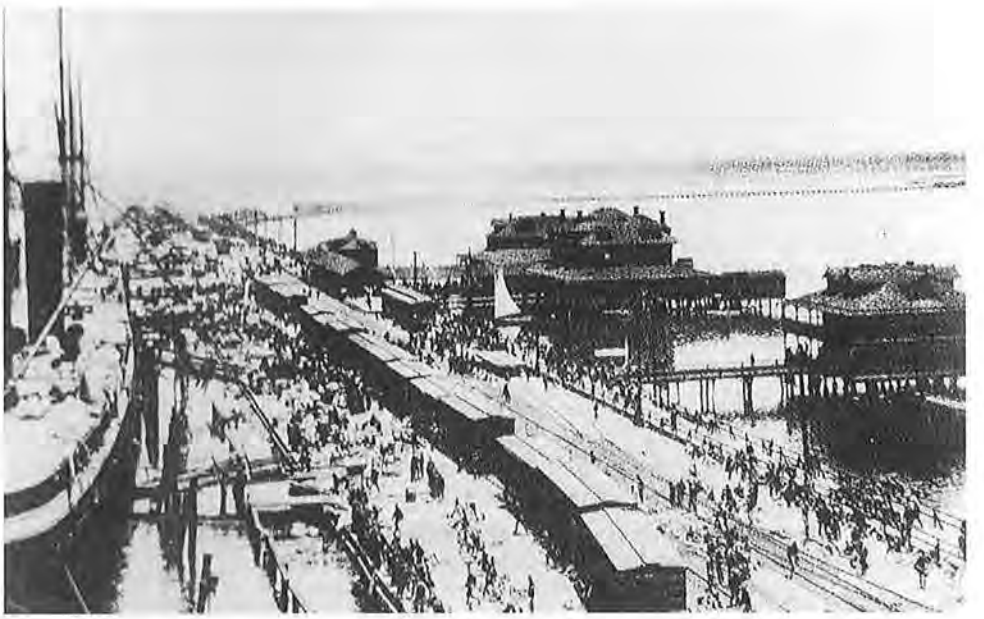
Reproduced from George Kennan, *Campaigning in Cuba* (New York: The Century Company, 1899), pp. 48–52.



Issuing Beef at Tampa, 1898

destination might know the exact nature, quantity, and car-location of supplies brought by every train. Then, if he wanted twenty-five thousand rations of hard bread or fifty thousand pounds of rice before the cars had been unloaded, he would know exactly where and in what cars to look for it. As it was, he could not tell, often, what car contained it without making or ordering personal examination, and it was almost impossible to know how much of any given commodity he had on hand in trains that had not yet been unloaded or inspected. As the result of this he had to telegraph to Jacksonville at the last moment before the departure of the expedition for three or four hundred cases of baked beans and forty or fifty thousand pounds of rice to be bought there in open market and to be sent him in "rush shipment." It is more than probable that there were beans and rice enough to meet all his wants in unloaded trains at Tampa, but he had no clue to their car-location and could not find them. Such a state of things, of course, is wholly unnecessary, and it should not occur a second time. To take another example:

When our army embarked at Port Tampa it was the business of some officer somewhere to know the exact capacity of every transport and the numerical strength of every regiment. Then it was some one's business to prearrange the distribution of troops by assigning one or more designated regiments to one or more designated steamers and giving necessary orders to the colonels. As it was, however, according to the testimony of every witness, a train-load of troops would come to the docks at Port Tampa, apparently without orders or assignment to any particular steamer, and while they were waiting to learn what they should do, and while



Embarkation of V Corps at Tampa

their train was still blocking the way, another train-load of soldiers would arrive in a similar state of ignorance and add to the disorder and confusion As a natural consequence, men got on wrong steamers and had to be unloaded, and often, after transports had moved out into the bay, parts of companies and regiments had to be transferred in small boats from one vessel to another. These are examples of what seems to have been bad management. In another class of cases the trouble was apparently due to mistaken judgment. To the latter class belongs the loading and treatment of horses and mules. It would have been much better and safer, I think, to load these animals on vessels especially prepared for and exclusively devoted to them than to put them into stifling and unventilated holds of steamers that also carried troops. If, however, this was impracticable, it was manifestly best to load the animals last, so as to expose them for as short a time as possible to such murderous conditions. The mules, however, were loaded first, and held in the holds of the transports while troops were embarking. They began to die from heat and suffocation, and then they were unloaded and reshipped after the troops were on board. This caused unnecessary delay, as well as the loss of many valuable animals. Eighteen perished, I am told, on one transport while the troops were embarking.

These cases of disorder and bad judgment are only a few out of many which were the subject of common talk among officers and civilians in Tampa. I could specify many others, but criticism is at best unpleasant duty, and the only justification for it is the hope that, if mistakes and disorders are pointed out and frankly recognized, they may be guarded against in future.

The army of invasion, when it finally left Tampa Bay for the Cuban coast, consisted of 803 officers and 14,935 enlisted men.[1] With its animals and equipment it filled thirty-five transports. It comprised (in addition to regular infantry) four batteries of light field-artillery, two batteries of heavy siege-guns, a battalion of engineers, a detachment of the Signal Corps, twelve squadrons of dismounted cavalry, and one squadron of cavalry with horses. All of the troops were regulars with the exception of three regiments, namely, the First Cavalry (Rough Riders, dismounted), the Seventy-first New York, and the Second Massachusetts. The command was well supplied with food and ammunition, but its facilities for land transportation were inadequate; its equipment, in the shape of clothing and tentage, was not adapted to a tropical climate in the rainy season; it carried no reserve medical stores, and it had no small boats suitable for use in disembarkation or in landing supplies on an unsheltered coast. Some of these deficiencies in equipment were due, apparently, to lack of prevision, others to lack of experience in tropical campaigning, and the rest to lack of water transportation from Tampa to the Cuban coast; but all were as unnecessary as they afterward proved to be unfortunate.

When the army of invasion sailed, the Red Cross steamer *State of Texas*, laden with fourteen hundred tons of food and medical supplies, lay at anchor in Tampa Bay, awaiting the return of Miss Barton and a part of her staff from Washington. As soon as they arrived, the steamer proceeded to Key West, and on the morning of Monday, June 20, after a brief consultation with Commodore Remey, we sailed from that port for Santiago de Cuba. In the group assembled on the pier to bid us good-by were United States Marshal Horr; Mr. Hyatt, chairman of the local Red Cross committee; Mr. White, correspondent of the Chicago "Record," whose wife was going with us as a Red Cross worker; and Mrs. Porter, wife of the President's secretary, who had come with Miss Barton from Washington to Key West in order to show her interest in and sympathy with the work in which the Red Cross is engaged. About ten o'clock the steamer's lines were cast off, the gang-plank was drawn ashore, the screw began to churn the green water into boiling foam astern, and, amid shouted good-bys and the waving of handkerchiefs from the pier, we moved slowly out into the stream, dipped our ensign to the *Lancaster*, Commodore Remey's flagship, and proceeded down the bay in the direction of Sand Key light.

Notes

[1] Report of General Miles ("Army and Navy Register," November 12, p. 311). General Shafter reported to the Secretary of War, September 13, that he sailed from Tampa with 815 officers and 16,072 men. General Miles is probably right.

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Logistical Problems in Cuba, 1898

Introduction. Lt. Col. E. A. Garlington, an Inspector General, makes an official report of his observations of the assembly and movement of the Cavalry Division of the V Corps to Cuba and its subsequent operations in Cuba with particular emphasis on matters of supply and transport. His report provides a detailed look at some of the logistical problems encountered during the Spanish-American War.

WAR DEPARTMENT, INSPECTOR-GENERAL'S OFFICE,
Washington, D.C., October 1, 1898.

SIR: I have the honor to submit the following report of my work during the year 1897–98:

From July 1, 1897, to April 16, 1898, I performed the duty of inspector-general, South Atlantic district, and assistant to the Inspector-General. At such I alternated with Lieut. Col. J. P. Sanger, inspector-general, in the periodical inspection of the money accounts of all disbursing officers stationed within the district; inspected the Augusta Arsenal, Augusta, Ga.; Allegheny Arsenal, Pittsburg, Pa.; Fort Monroe Arsenal, Fort Monroe, Va.; the subsistence depot and quartermaster depot, New Orleans, La.; the recruiting station at Richmond, Va.; camp of the Girard College Cadets at Island Heights, N. J.; seven national cemeteries; Fort Myer, Va., and Washington Barracks, Washington, D. C.

The assignment of inspectors-general and acting inspectors-general to duty at the headquarters of the several military departments under Special Orders, No. 89, Adjutant-General's Office, April 16, 1898, virtually abolished the inspection districts, and left me on duty as assistant in the office of the Inspector-General.

On May 19, 1898, I left Washington in your company to inspect the troops and camps at designated points. This inspection, under your directions, began at Camp Thomas, Chickamauga Park, Ga., and continued, except when prevented by acute illness for several days, until June 3, when, in obedience to your instructions, I left

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Reproduced from the *Annual Report of the Major-General Commanding the Army to the Secretary of War, 1898* (Washington, D.C.: Government Printing Office, 1898), pp. 663–69.

for Tampa, Fla. The reports of that inspection were handed in from day to day, special mention being made of anything requiring immediate attention and admitting of remedy on the ground.

The Inspection at Chickamauga.

This inspection developed the fact that none of the regiments was ready for service either as to equipment or instruction; that they were all short of medicines and hospital equipment, and in one regiment (First Missouri) many men appeared in ranks without shoes or stockings. There was a shortage of underclothing throughout the regiments inspected, and, in view of the limited bathing facilities, this was a very important deficiency. Except in the Second Wisconsin, the examination of the kitchens showed, as a rule, an absence of cooks able to handle the ration as issued, principally in making bread. At this time no soft bread and only one issue of fresh beef had reached the troops. The Second Wisconsin, having many men accustomed to life in logging camps, knew something of cooking. All complained of the bacon as being too fat; very few of the men had ever eaten such meat before. In a few instances complaints were made of short issues on certain articles, but it was impossible to get at concrete facts. The main trouble seemed to be the want of quartermasters and commissaries acquainted with the details of their respective duties. In all the regiments a shortage of transportation existed, but was being remedied. It appears that harness and wagons did not arrive at the same time, and, while the depot quartermaster had mules, other shortages prevented the equipment of regimental trains.

The water supply was insufficient. At each well crowds constantly gathered, and long delays occurred in getting water for cooking purposes even. This condition was being remedied by laying additional pipes.

In most instances the kitchens and sink pits were inadequate and in bad condition. The attention of commanding officers was in each case directed to them. It is my experience that throughout the Army these pest holes, the weak spots of all camps, do not receive the constant supervision of medical and company officers which the situation demands. The disposal of human excreta and kitchen refuse in large camps is a subject demanding the most careful consideration by those skilled in sanitation, and the adoption of some effective system is imperative; but no system can be successful without a most thorough cooperation on the part of medical and company officers.

My experience at this camp, where about 50,000 men were collected, and at Tampa, Fla., demonstrate that it is a grave error to mobilize large numbers of volunteer troops in one camp. The consequences necessarily attendant upon large assemblages of citizens unaccustomed to camp life and its environments, to say nothing of the almost insurmountable difficulty of supply, would seem to be apparent. This mass of men at Camp Thomas in May can properly be called an assemblage of citizens organized into regimental and other units, but for the most part having only the form of soldierly attributes, beyond unlimited courage and patriotic enthusiasm. The material was as fine as any in the world. As far as the

terrain goes, Chickamauga Park appeared to me to afford an ideal camping ground. As early as May there were rumors of disapproval of the water. I understood that a report had been made by the chief surgeon to higher authority that the water was not safely potable without boiling. Everyone who has commanded troops knows how nearly impossible it is to force soldiers to boil water before drinking it when facilities for boiling are convenient. When these are wanting, have to be hunted up or improvised, the difficulty is well nigh unconquerable.

The railroad from Chattanooga to Chickamauga Park—11 miles—was a single track. The terminal facilities at the park at that time were limited. Troops were arriving daily in large numbers; a great amount of freight was being delivered, consequently the congestion was more or less acute. It appeared to me that neither of the staff departments had a sufficient number of subordinate officers or skilled civilian employees to render the character of service that the situation demanded. So much assistance had to be given to the staff officers of volunteers in the simplest routine matters that delay in filling requisitions necessarily resulted, for which the staff departments were unjustifiably blamed. This condition should be anticipated during the mobilization of volunteer troops, and any officer that performs the duty of quartermaster or commissary should be given skilled assistants without stint; and the necessary authority, with reasonable discretion, should be given the *officer on the ground* as to departing from the cast-iron rules and regulations where the emergency demands it.

The evils of too much centralization in the administration of the supply departments were made manifest during the war.

The weather was very hot. Some regiments were marched a long distance during the hottest hours of the day, it being impracticable to unload all at the park. Great quantities of water were drunk, and much "slush" and badly cooked food found a way to men's irritated stomachs, which, with an entirely new and strange diet, only accentuated the condition, thus early in the soldier's life preparing a thrifty hotbed for future disease germs. As a rule, the camps were located in timber, and, in some cases, not easily, susceptible of drainage. All regiments were armed with the Springfield rifle, of which many were unreliable as a battle weapon.

It seemed as if the States had unloaded on the regiments entering the service of the United States all the old arms, with the idea that they would be replaced by the Government. I estimated that about 50 per cent of the arms were not suitable for battle. Many of the regiments were equipped with the McKeever cartridge box, useless for war; some had a knapsack, also useless in active service. All these deficiencies indicate a state of unpreparedness of State troops for sudden call into active service, and should teach a lesson never to be forgotten by those responsible for national defense.

It is easily ascertainable what the quota of each State is under a call of a hundred thousand troops, which is probably the lowest number of volunteers that the President would ever call out at the beginning of any war emergency. If in each State a depot were established, containing the full equipment, except means of transportation, based upon the respective State's quota, how easy it would be to

arm and equip the force each would furnish on the first call. State camps are more appropriate for training troops in the earlier days of mobilization, and I think should be the rule in future.

Cuban Campaign.

At Tampa, Fla., on the 7th of June, I received an order to report for duty to Maj. Gen. Joseph Wheeler, U. S. Volunteers, commanding the Cavalry Division, as inspector-general of that division, and executed it the same day. Under General Wheeler's order, and in his company, I made an inspection of that portion of the division camped at Tampa, a report of which is appended. (See Inclosure 1.)

The division was then under orders to proceed, dismounted, to Cuba with the Fifth Corps, or rather a part of it, viz, two squadrons from each of the following regiments: First, Third, Sixth, Ninth, Tenth, and First United States Volunteer Cavalry; the third squadrons and all the horses except those of the field and staff officers were to be left in the United States to follow as soon as transportation became available.

A finer body of soldiers than the Cavalry Division was never assembled; and while it was a source of extreme regret that the conditions made it necessary to leave a portion of regiments behind and to give up temporarily, as it was then thought, their horses, every man was proud of the opportunity and eager to form part of the invading force.

The division was organized into two brigades, commanded, respectively, by Brig. Gen. S. S. Sumner and Brig. Gen. S. B. M. Young, U. S. Volunteers.

Embarkation began early on the morning of the 9th of June. An soon as it was completed, by direction of General Wheeler and in his company I made an inspection of the troops aboard. The division was distributed as follows:

	Officers.	Enlisted men.	Aggregate.
FIRST BRIGADE.			
Transport No. 22, Rio Grande:			
General Sumner and staff	8	12	20
Third United States Cavalry	} 47	{ 433	} 914
Sixth United States Cavalry		{ 434	
	55	879	934
(Signal Corps)	(3)	(23)	(26)
Transport No. 1, Miami: *a*			
Ninth United States Cavalry	23	411	434
	78	1,290	1,368
SECOND BRIGADE.			
Transport No. 21, Leona:			
Brigadier-General Young and staff	11	17	28
First United States Cavalry	25	537	562
Tenth United States Cavalry *b*	17	355	372
	53	909	962

	Officers.	Enlisted men.	Aggregate.
Transport No. 8, Yucatan: *c*			
First United States Volunteer Cavalry	30	560	590
Two automatic guns; one dynamite gun.			
	83	1,469	1,552
Transport No. 17, Allegheny:			
Major-General Wheeler and staff *d*	15	16	31
United States Navy (Midshipman Royal)	1	...	1
Signal Corps	...	1	1
Hospital Corps		5	5
With horses		58	58
Volunteer aid (Mr. Mestre) 1			
Clerk (Mr. Wilson) 1			
Correspondent Atlanta Constitution (Mr. Cramer) 1			
Correspondent New York Journal (Mr. Leighton) 1			
Horses, including those of general, staff, and regimental staff officers of cavalry and infantry 149			
	16	80	96

a On the transport also, Sixth United States Infantry.

b Two troops of this regiment (4 officers and 112 enlisted men) transferred to transport No. 6, Alamo, before sailing.

c On the transport also, headquarters and four companies Second United States Infantry.

d Maj. Gen. Jos. Wheeler, commanding division.

Total:

Officers	177 (3)
Enlisted men	2,839 (23)
Horses	149
Civilians	4

At 6 o'clock on the morning of June 14 the *Allegheny* left its anchorage and dropped down to the quarantine station. In the afternoon about 4 o'clock, the fleet of transports put to sea. On the 20th, about 11.30 a. m., we lay opposite Santiago Harbor.

The transports of the Cavalry Division and of the Fifth Corps, except those having aboard Kent's divisions, were assembled opposite Daiquiri at 6 o'clock on the morning of the 22d. Debarkation began at 8 o'clock under the protection of the guns of the Navy. By the afternoon of the 23d of June the division, except the headquarters and the horses, were ashore. The horses could not be safely unloaded because of the distance of the ship from the shore and a high sea which came up during the day. The *Allegheny* was ordered to proceed from Daiquiri on the morning of the 24th to Siboney and there unload the horses, which was successfully accomplished that day under the supervision of Lieut. J. T. Dickman, Third Cavalry.

I was not present at the action at Las Guasimas on the 24th, having been left aboard transport by the general with the rest of his staff, except Major Beach and

Mr. Mestre, when he went ashore at Daiquiri. As soon as it became known that an action was in progress I, with Colonel Dorst and Captain Chanler, went ashore and joined General Wheeler at the front near Sevilla. The rest of the staff joined at the earliest practicable moment. On or about the 26th, I prepared, by General Wheeler's order, a scheme for outpost duty. The command was engaged from the 25th to the 30th in preparing for a forward movement.

During the period from the landing of the troops to the surrender of the Spanish forces, on July 17, it was impracticable to make any formal inspection of the command; but visits to the camps continued, and careful observation of the operations enabled me to keep in touch and to be informed as to the existing conditions. On June 22 and 23 I made an inspection of the division in its camp near El Caney.

On August 5 orders were received directing the division to return to the United States, but that the Ninth and Tenth Cavalry would not move until further orders.

I arrived at Montauk Point on August 17 and remained on duty there until August 26. The condition of the troops precluded any formal inspection, but after leaving the detention camp, under General Wheeler's instructions, I frequently inspected the camps of the different organizations and pointed out to the brigade police officers, who had full authority to apply remedies, such irregularities as were observed and which were susceptible of correction. Copies of written reports are appended.

I returned to my station on August 27, 1898.

General Observations.

Personnel.

As already indicated, the personnel of the Cavalry Division was superb, and as a fighting machine, within the limits of its arm, it had no superior on earth. The unparalled feat of arms accomplished by this dismounted cavalry at Las Guasimas and again at Santiago has won the admiration of the world. In the first action, without infantry support or artillery, except two Hotchkiss mountain guns served by cavalrymen, a portion of the Second Brigade attacked, charged, and captured a very strong natural position, further strengthened by intrenchments, held by a superior force of Spanish infantry, armed with one of the best types of modern rifles and supported by rapid-fire artillery.

At Santiago the entire division repeated the performance against a much stronger and more ably defended position, in face of a murderous infantry fire and a well-sustained fire of position and movable artillery. It should be remembered that the cavalry is armed with a short carbine; that on this remarkable July 1 the division was under a destructive fire in its bivouac around El Poso; that it moved along a single trail raked by the enemy's fire, infantry and artillery; that every twist and turn of the trail, with the ranges, were well known to the enemy. For several hours it was impossible to return the enemy's fire.

There was no proper artillery preparation for an attack. Only one battery was in position, and its fire was apparently concentrated on a part of the enemy's posi-

tion south of the heights captured by the Cavalry Division. That each man of this superb command did his full duty is a matter of record. Many officers and some enlisted men have received substantial reward for duty especially well done during that period, and others will undoubtedly get recognition later.

Arms and equipments.

The carbine seems to have stood the test of actual war to the satisfaction of cavalry officers. There are some who have a preference for a straight-pull weapon and a clip system of loading. The ammunition was good, and the bullet seems to have inflicted a more dangerous wound, under similar conditions, than that of the enemy, which was of slightly smaller caliber.

I heard no complaint of the ammunition belt, but it seems to me that a soldier provided with a belt with loops for single cartridges is at a disadvantage when pitted against one provided with a belt so arranged that five cartridges can be removed and put in the chamber of the weapon at one motion.

The chain attaching the stopper to the canteen is a little weak; should be stronger and more durably fastened to both the stopper and to the canteen; a canteen without a stopper is useless.

I think it would be well to increase the size of the haversack by 1 inch all around.

The meat can and the cup served their purpose well, but it would decrease the weight of the soldier's pack if they were manufactured of aluminum. It is recommended that the cavalry for service in the tropics be armed with the machete instead of the saber.

Clothing.

The clothing furnished the division was the ordinary issue, the same as for service within the United States. Some of the officers provided themselves with the authorized khaki uniform. Opinion differs as to the relative merits of woolen and cotton fabric as a material for uniforms in tropical countries. If a durable light-weight woolen cloth, gray or very light brown in color, can be procured, I think it would make the most generally satisfactory uniform. Light-weight woolen underwear and woolen stomach bands should also be issued and wearing both made obligatory, whether woolen or cotton outer clothing be worn.

The felt hats in the heavy and continuous rains soon lost shape, were very hot, and not very durable, but in the rough-and-tumble service incident to the campaign they were probably more satisfactory than any helmet; but for ordinary service during peace, a light, well-shaped helmet, protecting the head and the back of the neck, should be issued.

The leggings were not entirely satisfactory, and I am inclined to think that for service in the tropics the English pattern of legging used in Egypt and India is preferable.

The rubber ponchos were very inferior, soon leaked, and tore very easily. Every man should be issued a rain coat, "pommel slicker" for mounted men, and a short "slicker" for foot troops. Provided with a poncho, slicker, and rubber boots, I was not wet once while in Cuba, though without any form of tent for several weeks.

A short time before the division left Cuba, cotton uniforms, a sort of imitation khaki, were received, and, to some extent, issued to the troops. They were not in use long enough to determine their adaptability to the conditions existing. They were evidently hurriedly manufactured, ill fitting, and not attractive in appearance.

Food.

The travel ration is not entirely satisfactory for journeys at sea for more than two or three days. It does not appear to be suited to men in enforced confinement. In this case men were aboard ship fourteen days, some longer, and a diet of hardtack, canned roast beef, canned tomatoes, and bad coffee did not suit the conditions. The canned roast beef furnished was unpalatable and unsightly, and men very soon tired of it. As far as I was able to ascertain, no change from the ordinary ration as issued within the United States was made for troops serving in Cuba. If it has not already been done, the ration should be readjusted to the new conditions under which our troops will be called upon to serve. In the tropics a much larger percentage of the vegetable components, rice, and hominy should be issued. Oatmeal and dried and canned fruits should be added. Coffee in the berry should never be issued to soldiers separated from their baggage, as was done in Cuba. It should be roasted and ground. There should be also kept in the Commissary Department for issue without cost to the soldiers articles necessary to a diet ration suitable for the sick and convalescent from diseases incident to tropical countries.

Supply.

The most serious question confronting the division after landing in Cuba was the one of supply. The troops left the transports with three days' rations and 100 rounds of ammunition per man. Each officer and soldier carried his own pack. Means of transportation at all times were very limited. The trail soon became almost impassable by reason of heavy and continuous rains. It was only through the personal exertions of Lieut. P. W. West, Third Cavalry, acting chief quartermaster, and Lieut. J. T. Dickman, Third Cavalry, acting chief commissary, under the most discouraging conditions, that the division was kept supplied with one day's rations ahead, and these sometimes incomplete. One remained at the base of supplies, and the other accompanied the pack trains over the route day and night. They both deserve the highest credit for their services. Although they performed this important and hazardous duty, neither was given the rank of the position he filled—that of major and chief quartermaster or chief commissary of a division.

Medical Department.

It was clearly demonstrated that to render efficient service in war the Medical Department must be organized during peace on the same principles as during war. Field hospitals, tentage, and equipment complete should be in existence and under control of the Medical Department. Sufficient transportation for supplies and for the sick, ambulances, and stretchers should also be controlled by that department.

In Cuba the surgeons of this division and their assistants worked heroically, always under adverse circumstances. They were handicapped from the start by the small number present, want of transportation, scarcity of stewards and hospital

corps men. There was at times a deficiency in much-needed medicines, and at no time in Cuba was the department of itself able to properly feed the patients under its care. I am inclined to think that the rations for the sick should be under the control of the Medical Department, and, if necessary, the law should be so amended that a surgeon could call upon the Commissary Department for such articles of food for the sick as in his judgment the emergency demanded. The commissary should be required to keep for issue, not for sale, such articles as malted and condensed milk, soups, etc., upon the certificate of a surgeon that they are required for the sick.

Transports.

It is a remarkable fact that, without any previous experience in similar service, this division embarked at Port Tampa and debarked on a foreign shore with the loss of two men, accidentally drowned at Daiquiri, and one horse by death en route. The conditions were unusually favorable, and to the navy we owed the successful landing of the troops. The transport most expeditiously unloaded, the *Yucatan*, was taken in close to the pier of the Iron Company's wharf at Daiquiri by a local pilot, through the courtesy of Lieutenant Sharpe of the *Viren*.

After considerable experience at sea and very close observation of the Cuban expedition, it is my mature conviction that to secure the very best results under all conditions, the transport service at sea should be controlled by the navy, under a system easily and logically developed.

Discipline.

The discipline of the division was excellent under all circumstances. Only two serious infractions, both in the same regiment, came to my notice, and then the offenders were promptly brought to trial.

Gatling Battery.

Lieut. J. H. Parker's Gatling battery, though not officially a part of the cavalry division, occupied with it a position in the trenches before Santiago, and rendered most excellent service.

Very respectfully,

E. A. GARLINGTON,
Lieutenant-Colonel, Inspector-General.

The INSPECTOR-GENERAL, UNITED STATES ARMY,
Washington, D. C.

[Inclosure 1.]

HEADQUARTERS CAVALRY DIVISION,
Santiago de Cuba, Camp Hamilton, July 24, 1898.

SIR: I have the honor to submit the following report of an inspection of the Cavalry Division. The officers and soldiers are in urgent need of almost everything except arms and ammunition. The former can supply themselves when the transports are unloaded and their baggage is transported to camp, which is going on

now. I have verbally already reported the condition of the enlisted men as to clothing, and I understand requisitions are being prepared. They have no reserve supply on the transports and have only what they have on their backs. The articles most urgently needed are shoes, stockings, trousers, light-weight underwear, leggings, and hats. On the first day of the fighting the men put aside their packs and in most cases lost them. Yesterday some fresh beef was issued to the division—the first since leaving Tampa, on the 13th of June. A more varied diet is urgently needed; beans and rice even, owing to limited transportation, have not been regularly issued, and since leaving transports the command has been living on hard-tack, bacon, sugar, and coffee.

It has been and is now extremely difficult to get any officers' stores, and such as have been gotten have been in very limited quantities. In this climate, with so many enervated men, canned fruits, oatmeal, etc., should be added to the ration irrespective of cost. The commissary should also have meat extracts for sale.

As already known from other sources, this inspection discloses a very large sick list. The surgeons report about 90 per cent as malarial fevers, rest the ordinary camp diseases—no serious cases; but the men uniformly appear weak, enervated, tired—need as near absolute rest as possible and change to a cooling, nourishing diet.

The chief surgeon reports the hospital medicines limited in variety. Five additional surgeons, 5 stewards, 12 hospital-corps men, and 6 hospital tents and flies are needed. In the First Brigade the hospitals are consolidated under the supervision of Captain Harris, Medical Department. On the 23d there were 201 cases in hospital. There was no tentage except shelter tents; no cooking utensils except two camp kettles and the meat- ration can; no food except straight rations. It is hard for sick men under such conditions. At this hospital there are not sufficient stimulants and calomel and soda tablets. The hospital is well located, near a good spring.

In the Second Brigade there are regimental hospitals. The First Cavalry has 1 conical wall tent, but is expecting supplies from Daiquiri. This hospital is very much in need of the cook, who is absent in Daiquiri.

In the Tenth Cavalry there are 3 A tents and 1 wall fly. The surgeon in charge reported practically no medical supplies; needs 1 medical field chest and 1 surgical field chest, also acetate of potassium, chlorate of potassium, and an apparatus for the examination of urine. The First Volunteer Cavalry has a paulin. The surgeon reports that he requires 500 cubic centimeters of Warburg's tincture.

The troops have been without cooking utensils, but are being gradually supplied as the transports are unloaded. The question of transportation is a very serious one, and if the number of pack mules assigned to this division can not be increased from those now on the island, and it is contemplated to keep the division here for any length of time, at least 250 mules, with proper number of civilian packers, should be shipped from the United States at once. As the matter now stands, only one day's supplies ran be furnished without taking into consideration any change of camp, storms, or anything that would interrupt the ration supply.

The most important questions now to be considered are a nutritious diet suited to building up constitutions weakened by battle, fever, and exposure; rest for

the command; proper shelter from the rain and sun; suitable clothing; and sufficient transportation. The matter of supplying officer's stores, including mineral water, should be adjusted as soon as possible, and the division commissary be furnished such articles for sale.

None of the regiments except the First Volunteer Cavalry, which has one wagon, has any transportation.*

Very respectfully,

E. A. GARLINGTON,
Major, Inspector-General, Cavalry Division.

ADJUTANT-GENERAL CAVALRY DIVISION

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* It was subsequently discovered that the Tenth Cavalry also had one wagon and that the First Volunteer Cavalry had several mules. October 1, 1898.

38

The Campaign in Puerto Rico, 1898

Introduction. Maj. Gen. John R. Brooke makes an official report of his campaign in Puerto Rico during the Spanish-American War of 1898, with particular emphasis on matters of supply and transport. Brooke's report provides an excellent insight into the problems of an overseas campaign in 1898 from the commander's perspective.

HDQRS. UNITED STATES TROOPS IN PORTO RICO,
Guayama, Porto Rico, September 3,1898.

The ADJUTANT-GENERAL UNITED STATES ARMY,
Washington, D. C.

GENERAL: I have the honor to report that since my last annual report for the year 1897 I was in command of the Department of the Missouri until March 11, 1898; from that time to the 20th of April, 1898, in command of the Department of the Lakes; headquarters of both commands at Chicago, Ill. When under orders from War Department I went to Chickamauga Park, Georgia, and assumed command of Camp George H. Thomas and Provisional Army Corps, constituted by General Orders, No. 25, current series, Headquarters of the Army. This corps consisted of 6 regiments of cavalry, 10 batteries of artillery, and 7 regiments of infantry, all from the Regular Army. This army corps was broken up by sending the troops farther south, and on the 16th of May I was assigned to command of the First Army Corps and the Department of the Gulf, by General Orders, No. 46, Adjutant-General's Office, 1898. I retained my headquarters at Camp George H. Thomas, where I organized the First Army Corps complete and two divisions of the Third Army Corps.

The records and correspondence of the departments of the Missouri and the Lakes having been left at Chicago, Ill., I have no data at hand from which to make a detailed report. It is supposed the present department commander will give it in full. During the year I made a critical inspection of all the troops and posts in the

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Reproduced from the *Annual Report of the Major-General Commanding the Army to the Secretary of War, 1898* (Washington, D.C.: Government Printing Office, 1898), pp. 137–40.

Department of the Missouri. I had no opportunity to inspect the posts of the Department of the Lakes.

As to the matter connected with Camp George H. Thomas at Chattanooga and Chickamauga National Park, Georgia, at which I arrived with my staff on the 20th of April last, I would say that the record of the arrival and departure of troops from that camp are not now on hand, and I can not therefore give exactly the numbers of troops which occupied that camp during my command there, neither can I adequately portray the difficulties attending the equipping of nearly 70,000 men at that place. The establishment of the camp was a matter of grave concern to me, and I did the best I could in the territory designated, placing all troops in the most healthful locations available, leaving space for drills vacant. One of the principal difficulties encountered was the supply of water, which was overcome by the establishment of pumps and mains, through which was sent a large supply of water from the Chickamauga Creek, the analysis of which showed that it was good water. A large number of wells were bored, supplying good water by that means; nevertheless, in this large assemblage of men disease of various kinds soon took hold; this in spite of all the sanitary precautions taken to avoid it.

On the 14th of July I was summoned to Washington and there was informed of the purpose to send me to Porto Rico with a large force to be drawn from my corps (the First Army Corps at Camp George H. Thomas). This corps was fully organized and ready for field service, a fact which I had reported some time before.

In the establishment of this (Camp George H. Thomas) the services of my staff were of inestimable value. Col. M. V. Sheridan, now brigadier-general of volunteers, as adjutant-general, displayed the high qualities with which he is endowed, and rendered his country most efficient service throughout. Col. J. G. C. Lee, assistant quartermaster-general, as chief quartermaster, did such services as is rarely seen in our Army. Where there was nothing he created a supply depot which met all the wants of the command, displaying by his patience, ability, and energy the highest qualities of an officer of his department. What should have been his leisure was fully occupied in instructing the officers of the quartermaster's department of volunteers, who came there entirely unacquainted with their duties. Lieut. Col. A. Hartsuff, deputy surgeon-general, was busily engaged in organizing, instructing, and supplying the medical department of this large volunteer force. Lieut. Col. H. G. Sharpe, assistant commissary-general of subsistence, was equal to the great drafts made upon him, establishing a fine depot and fully met the demands in all ways, particularly in supplying fresh beef and fresh bread. He was ably assisted by First Lieut. J. M. Arrasmith, Second Infantry, as a depot commissary. Col. Sharpe also spent a great deal of his time in the instruction of the officers of his department serving in the volunteer commands. Lieut. Col. James Rockwell, jr., chief ordnance officer, was invaluable in his efforts to equip the regiments with their ordnance equipment. These officers were of those who were most constantly employed in the outfitting of the troops. The other members of my staff performed their duties with ability and energy throughout.

In criticism I would say that all the departments were handicapped by the unusual demands made upon them, and their inadequate equipment, which was

based upon the demands of an army of 25,000 men, was painfully apparent. This was gradually overcome by the extension of their means of supply until, finally, the troops were equipped. The system which led up to the difficulties which oppressed the War Department during this time should receive that attention which will prevent a like occurrence in the future. It is scarcely necessary to further discuss this phase of my experience in the last few months, for it is so well known that it is unnecessary to say anything further.

On the 23d of July I left Chickamauga National Park with my staff and headquarters, arriving at Newport News on the 25th, where I remained until the 28th to embark the troops and transportation going with me.

On my departure from Newport News, on steamer *St. Louis*, accompanied by the brigade of Brig. Gen. P. C. Hains, United States Volunteers (Second Brigade, First Division, First Army Corps), I encountered great difficulty in the loading of the troops. I regard the transports as improperly fitted and unsuited to the work required of them. Particularly was this manifest in the means of cooking the food of the soldier. The result of this was that the men were weakened by it, the cold travel ration being insufficient to maintain a healthy condition of the system, so that on our arrival on the coast of Porto Rico they were at subjects for the local diseases in this tropical climate, and many of them have become occupants of hospitals and from there sent home. Apparently few have died; these, I believe, to be generally the victims of typhoid fever.

Arriving at Guanica, Porto Rico, July 31, I was informed that General Miles was at Ponce, and directed my course to that point, where I was ordered by the Major-General Commanding the Army to proceed to and make a landing at Arroyo, Porto Rico.

On disembarking at Arroyo (which point was indicated by the Major-General Commanding the Army as the point he wished me to disembark the troops then with me), I found another very serious difficulty. No provision had been made for lighters and for means of towing these lighters to the beach from the ships, necessarily anchored in water sufficiently deep for their draft, and the large ships were a long distance from the shore. Had it not been for the presence of the navy the landing would have been impracticable, and but for the circumstance that a number of local lighters were available, which, had the Spaniards been active, might have been destroyed, the assistance of the navy would have been of no avail in landing our artillery and horses, mules and wagons. The engineers succeeded in constructing a small dock by the sinking of two lighters, and by utilizing some inch boards we were able to land artillery and other material with greater facility than was possible when the lighters were practically beached at other points. All these matters should lead to the adoption of practical means to accomplish this purpose, and particularly should every expedition be supplied with the material and necessary implements to build a reasonable dock at which ships might be unloaded. This could have been done at Arroyo and at Ponce had the material and labor been at hand, and would greatly have facilitated the use of troops and supplies in furthering the purpose of their being sent here, and it may be, and possibly will be, necessary in the future.

There were two slight engagements with the enemy, one in the occupation of Guayama, in which a few of our men were wounded, and some loss, extent not known, inflicted upon the enemy; and in another reconnoissance [*sic*] a few men were wounded, and which developed the fact that the enemy were strongly entrenched on the road across the mountains to the north of Guayama. This led to an effort being made on the 13th of August, and which had been delayed until that time by the nonarrival of cavalry and artillery and a few wagons, which, fortunately, reached us to transport our supplies. A turning column was sent out under command of Brigadier-General Hains, while the main force moved up the road to San Juan and prepared to open on the enemy's position with artillery, the purpose being to throw the force under General Hains across in rear of the enemy's position, which would doubtless have led to his capture. Everything was ready for the transaction of this purpose when the announcement reached me of the signing of the protocol and the suspension of hostilities, upon which I recalled the troops and encamped them about Guayama, and turned my attention to taking care of their health and supplying them.

At this date I am about to take my departure, with my staff and a small escort, to San Juan, to join the commissioners who have been appointed with me for the purpose of arranging the terms for the immediate evacuation of the island of Porto Rico.

I desire to express here my thanks to all the members of my staff, who have displayed at all times ability and zeal in the transaction of their various duties, made more arduous in all cases by the inadequacy of the means at hand.

Very respectfully,

JOHN R. BROOKE,
Major-General, Commanding.

39

Logistical Operations in the Philippines, 1898

Introduction. Maj. Samuel R. Jones, Quartermaster of the Second Division, describes his activities during the VIII Corps' battle for Manila in 1898. Jones' account provides a brief insight into the conduct of logistical operations at a relatively low level during the Spanish-American War in the Philippines.

MANILA, P. I., *August 14, 1898.*

ASSISTANT ADJUTANT-GENERAL,
Second Division, Eighth Army Corps, Cavite, P.I.

SIR: I have the honor to submit herewith a report of work performed from the arrival of the first expedition at Cavite, June 30, to the capture of Manila, August 13, 1898.

The unloading of the troops and supplies from the ships commenced on the first of July and continued until all were landed at Cavite. Storehouses were obtained for the quartermaster and subsistence stores and troops supplied with barracks and cooking facilities. Fuel was scarce, but by constant effort of the Department and assistance from the troops the supply was sufficient, though precarious. By July 13 all stores had been landed and stored, means of water transportation being by native lighters, or cascos and captured tugs loaned by the Navy Department.

On July 15 began the transfer of troops to Camp Dewey, which was established between Pararñaque and Manila, about 4 miles from the latter place, by the First California Volunteers, followed by the troops of the second expedition under General Greene, which arrived in the harbor July 17. These troops, with ten days' rations and all camp equipage and ammunition, were safely landed by July 22.

July 27 I was ordered to take station at Camp Dewey in charge of transportation, and from that time until August 12 I was constantly at work landing troops,

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Reproduced from the *Annual Report of the Major-General Commanding the Army to the Secretary of War, 1898* (Washington, D.C.: Government Printing Office, 1898), pp. 60–62.

supplies, and ammunition at Camp Dewey and Parañaque. The labor was most arduous, requiring me to be in the mud and water from daylight until after dark daily. Such train as I was able to form from the native ponies and buffaloes was used, and, in spite of a severe storm of nine days' duration, incessant rains, and almost impassable roads, the troops and all necessary supplies were transported, with slight delay, no loss, and little damage, to the camps assigned them. Native bamboo beds were supplied for every tent in the command, so that the troops were all raised from the ground. A large number of similar beds were placed in the trenches to aid in keeping the men dry, and the hospitals were similarly supplied. I was able to furnish transportation to the batteries to haul their guns to the trenches. During the fighting of July 31 and August 2 I supplied the fighting line with ammunition and the medical department with transportation for their wounded.

On the morning of August 12 I transported the reserve ammunition to the several stations selected, and then turned my transportation over to the medical officers for an ambulance train, with the exception of the buffaloes, which were turned over to the artillery to transport guns.

Just before the attack on the city began I reported to the commanding general of the division and remained with him until the troops advanced on the Malate fort, when I received permission to accompany General Greene's advance. I remained with the latter, doing duty as an aid, until he reached the walled city, over which the white flag had been raised, after which I reported back to the division commander.

The work from the first landing at Cavite until the fall of the city was incessant and most arduous. The necessity of employing natives, the difficulty of handling a people of a foreign tongue and peculiar training, and the fact that many questions of pay and authority had to be decided upon at the instant, rendered my presence absolutely necessary at all times. In spite of the weather and the lack of facilities except such as could be picked up in an enemy's country, the work was done promptly, and the troops were never without their supplies. Moreover, the total expenditures for labor, supplies, transportation, and protection from the weather was less than $20,000, Mexican silver.

Capt. W. A. Harper, assistant quartermaster, United States Volunteers, reported at Camp Dewey August 2, and was assigned to duty as quartermaster, Second Brigade. He entered into the work most enthusiastically and rendered me great assistance, as did also Capt. C. G. Sawtelle, jr., assistant quartermaster, United States Volunteers, who reported with the First Brigade, August 7.

Of my clerks, W. L. Coakley, G. A. Courtright, Joseph S. Joplin, and Dan B. Lady, who most cheerfully endured every discomfort, and, with few facilities, kept up to date the work and records, I can not speak too highly.

I would be remiss in my duty if I failed to call attention to the hard work and gallant conduct of Private Francis Finley, Company C, First California Volunteers, who was on special duty as my interpreter. Through storm and wet, often without rations, he was ever ready for any work that was required of him.

During the attack on the Pennsylvania regiment, July 31, I sent him out with a supply of ammunition in six carts with native drivers. A short distance in rear of

the trenches it was necessary to pass through a heavy fire from the enemy. One horse was killed and a native driver wounded, whereupon the other natives deserted their teams. Private Finley got some soldiers to assist him, and delivered the ammunition at the trenches. Returning through the same fire, he stopped, picked up two wounded officers and brought them to the hospital. Later he returned to the trenches with 12 caramettas to bring in the wounded. On the day of the battle he remained with me, and when it became necessary for me at one place to prevent the insurgents from entering the city I had no one but him to assist me. But he bravely took his stand in the middle of the street and held it, notwithstanding there were over 150 armed insurgents in front of him, rendered furious by our refusal to admit them. I earnestly recommend him for such reward as the higher authorities may see fit to confer.

Respectfully submitted.

SAM. R. JONES,
Major and Quartermaster, U. S. Volunteers,
Corps Quartermaster, Second Division, Eighth Corps.

40

Secretary Root Outlines His Reform Program

Introduction. The two major aspects of the Army reform program proposed by Secretary of War Elihu Root to correct the deficiencies found during the Spanish-American War were a reorganization of the supply departments and the creation of a general staff to plan future operations. Here Secretary Root outlines his program to the Senate during hearings which ultimately led to passage of his program in 1903. Note in particular Secretary Root's references to the Army as "a business."

THE EFFECTIVE ORGANIZATION OF THE ARMY

STATEMENT BEFORE THE SENATE COMMITTEE ON MILITARY AFFAIRS, WASHINGTON, MARCH 12, 1902

Mr. Root's statement regarding the plan and purpose of the reorganization of the army, made in a letter to the chairman of the Senate Committee on Military Affairs, March 3, 1902, followed several previous hearings before the House and Senate Committees on Military Affairs, which are omitted, the substance of his remarks appearing more fully in later hearings. On March 12, the Secretary of War appeared before the Senate Committee to describe more fully the need for and the working of his plan. On December 13, 1902, he appeared before the House Committee on Military Affairs; and on December 17, he appeared again before the Senate Committee. His several statements at these hearings are presented. Frequent interruptions and questions by members of the committees are omitted, except as they throw light on the development of his argument. These omissions are indicated by . . .

Reprinted by permission of Harvard University Press from Elihu Root, "The Effective Organization of the Army: Statement before the Senate Committee on Military Affairs, Washington, March 12, 1902," in *The Military and Colonial Policy of the United States: Addresses and Reports*, Robert Bacon and James Brown Scott, eds. (Cambridge, Mass.: Harvard University Press, 1916), pp. 411–15.

MR. CHAIRMAN, this bill contains two series of provisions of primary importance, together with a number of minor provisions on separate subjects. The provisions of primary importance are, first, a series of provisions for the consolidation of the supply departments. The second series of provisions is for the creation of a general staff. Both of these provisions seem to be of very great importance—to be necessary to an effective organization of the army. Neither of them will require any appreciable increase in the number of officers. They are simply a rearrangement of the present official force in such a way as to make that force more effective; and they are merely putting on paper the lessons which I believe have been generally deduced from observation of the working of the present system in the war with Spain.

As to the consolidation of the supply department, we have now a quartermaster, commissary, and pay department, each one running by itself.

The CHAIRMAN. You provided for a transportation division?

Secretary ROOT. Yes, General; there is a Quartermaster's Department, and the Quartermaster-General has charge of transportation. He also has charge of the purchase and manufacture of clothing. The work of his division is in two classes of duty, and no more. He transports his own clothing and the feed for the horses and a considerable variety of stores which he provides, and he also transports the subsistence which the Commissary-General provides, and the material which the Surgeon-General provides, and the ammunition and material from the Ordnance Department. The Paymaster-General pays the troops.

The Commissary-General pays for the food and the supplies which he has. Each one has his own machinery, and each one has his own business; and when it comes down to the accomplishment of any single purpose there is no one to bring them together and see that they move step by step, and that each one is doing his share in the accomplishment of that purpose, except a civilian Secretary of War, who knows nothing about it, and does not learn anything about it until it is time for him to go out of office, if he does then.

In the successful business world work is not done in that way. What would happen if a railroad company, or a steel corporation, or any great business concern, should divide its business up in that way ? What would become of that business?

The Paymaster-General several years ago had a paper carefully prepared in which he proposed that he should take the payment of the bills of the quartermaster and commissary. There is no reason why he should not. That means just one step toward the consolidation. Every few weeks when operations are active, there comes in complaint that some-

thing has not yet arrived. Whose fault is it? The Quartermaster-General blames the Commissary-General and the Commissary-General blames the Quartermaster-General. The Commissary-General wants leave to make his own shipments and take his own bills of lading and have the responsibility and authority to see that the supplies he is furnishing go to their destination, without putting them through the hands of the Quartermaster-General. Each department is trying to get from the other details which it thinks necessary to complete its own work; and when we consider each one's view of the situation and the changes that ought to be made, it is impossible not to think that they ought all to be under one head, and that head a military man.



Elihu Root

Some time ago, I asked the different departments if they could not agree on this subject, and they all have agreed upon the general proposition. They differ as to details.

In drafting this bill I have necessarily put the details down—have arranged the method of accomplishing this result to which they all agree—as it seemed to me was best; but I suppose the committee will settle the details, if it considers favorably any method. The principle of having these great supply departments under one head is that there will be some officer whose business it is to coördinate their action, instead of leaving it all for the Secretary of War to do; and the question of method which is determined in the draft of the bill may or may not be satisfactory. The method that was adopted in the draft of the bill was to have one supply department called the Department of Supply. . . .

The Commissary-General thinks that there ought to be an absolutely hard and fast line between the members of the different divisions of the new department, just as there is now between the different departments. The Quartermaster's Department does not think that. They differ on that point. I agree with the view of the Quartermaster's Department that it should be possible to impose upon one man the duties of all three, although I think it is quite right that they should be assigned to the sep-

arate divisions; that is, that one man should be assigned to the subsistence division, another to the finance division, and so on. But I think that the War Department should be at liberty to impose upon one man the various duties of all three; that is, to require the man, even though he is assigned to the subsistence division, to do quartermaster's duty, or finance duty, wherever it is possible for one man to do all the work; that is, there ought to be some elasticity. . . .

Before leaving the subject of the consolidation of the supply departments, let me say that in my judgment it will greatly reduce the paper work necessary; it will reduce what is sometimes spoken of as red tape. It will put it within the power of the man at the head to accomplish results without carrying on a diplomatic correspondence between two departments that ought to be attending to business instead of standing off and referring matters to each other.

Now, the proposition of the bill is to make a department called the Department of Supplies, with a major-general at the head, and under it four divisions, the subsistence division, the supply and construction division, which takes one-half of the present quartermaster's duties, the transportation division, which takes the other half of the quartermaster's duties, and the finance division, which serves as a cashier for the whole business. I am confident that that would prove to be a much more practical and efficient business system than that which we have today. . . .

I started last year an improvement of Governor's Island with the idea that that should be made a great depot for the receipt and distribution of supplies, and a base for the government's use in fitting out any expedition which might be necessary along our Atlantic coast or for the West Indies. I got from the state of New York a grant of about seventy or eighty acres of land, under shallow water which lay south of Governor's Island. You made us an appropriation of $260,000, for a starter and we are at work dredging to make wharfage on the north side of the Island.

We double the area of the Island by the additional land we are filling in, and abandoning the separate ordnance depot there, the arsenal, and we are proposing to put up a series of storehouses in which can be stored all the imperishable supplies necessary for a large expedition. There will be room on the Island for troops in case we want to send out such an expedition. We can put troops on the Island and transfer them to transports of the deepest draft, which can come up to the wharf on the north side. That is utilizing our property.

Now, I want to know what is necessary for the fitting out of such an expedition. To whom do I go ? I cannot tell. Military authorities have got to work it out, and it has got to be worked out in detail. That is necessary in order to determine how the money that Congress has voted,

and has put in my discretion to expend in the construction there, shall be expended.

There is no single officer who could answer these questions. Indeed, I hardly know how to put the questions in detail. They should go to some military man who will say to this one, work out this part of the problem, and to another, work out that, and to another, work out that. First consider what are the ranges of possibility as to what an expedition being fitted out there would have to do, how long a time it would have to be absent, what kinds of supplies it would want, and then have the amounts of the different kinds of supplies worked out and the amount of storage room necessary for them. We must also be able to have worked out the other things for our ordinary uses that it will be necessary to do at that point. There is not anybody whose business it is to do that sort of thing except the Secretary.

41

The Evolution of the General Staff Concept

Introduction. Maj. Gen. James Murphy, Commandant of the National War College when this article was written, explains how the organizational deficiencies of the Army during the Spanish-American War led to reforms in Army administration in the early twentieth century. He emphasizes the connection between the logistical problems encountered in the War with Spain and the Root reforms, including the General Staff bill of 1903. Murphy's article is particularly useful for making the point that the Root reforms of the early twentieth century addressed logistical problems perhaps more than strategic or tactical ones.

By the 1890's a significant portion of the American people had come to accept that peculiar type of historical mysticism known as manifest destiny. Such a belief was spurred by a number of factors, chief among them being a vigorous mercantile spirit, Christian evangelism, and democratic idealism.[1] But the Spanish presence in Cuba, Puerto Rico, and the Philippines seemed to block an increasingly active American foreign policy in those areas.

By early 1898, however, a floundering Spanish foreign policy and the glare of yellow journalism had roused in the populace a strong feeling of aversion toward the Spanish regime in Cuba and Puerto Rico. With the sinking of the USS *Maine* in Havana Harbor on February 15, 1898, war with Spain had become an inevitability.

Chaotic Preparations

How well was the United States prepared to respond? Major General Hugh A. Drum, writing on *The Evolution of the General Staff*, perhaps best summarized the state of affairs: "The situation may be better pictured by the statement of the then Commissary General to the effect that his office was running perfectly until the war disrupted and disorganized it."[2]

Reproduced from James Murphy, "The Evolution of the General Staff Concept," *Defense Management Journal* 12, no. 3 (July 1976): 34–39.

This mentality set the stage for the events which followed. Since the nation had been at peace for over 30 years, the Army had rarely exceeded 26,000 men. With the declaration of war on Spain in April, however, the size of the Regular Army doubled and was further supplemented by more than 200,000 volunteers.

The task of mobilizing these quarter-million men was characterized by incompetence and unmitigated chaos. Years of compartmentalization of authority within the War Department created a near paralysis. No one knew where any of the essential troops, equipment, or supplies were or should be. Theodore Roosevelt, then only recently sworn in as a lieutenant colonel of volunteers, vividly described the scene at an embarkation port:

> . . . there were lots of regiments there; the trains backed up everywhere along the quay and the quay was swarming with some 10 thousand men, soldiers mostly. Transports were pulling in from mid stream but nobody could tell us what transport we were to go on. . . .[3]

Finally finding the Quartermaster General, who alone could assign transport, Roosevelt discovered that he and his men had been assigned to the *Yucatan*. But he was further surprised:

> . . . I happened to find out by accident that the transport, YUCATAN, had also been allotted to the Second Infantry, and the 71st New York, and I ran down to my men and left a guard and took the rest and rushed them down to the dock and got on the YUCATAN, holding the gangplank against the 2d Infantry and the 71st New York. . . .[4]

Indeed, the Expeditionary Force even departed for tropical Cuba clad in heavy woolen uniforms; not until late July did light clothing arrive in Santiago. In the absence of any preplanning or command and control mechanisms, a totally inappropriate organization resulted and insured the inevitability of the confusion which followed.

Had the enemy been other than a weak nation fighting more than 3,000 miles from home, the United States might have received a stinging defeat. The almost instantaneous collapse of Spanish forces at Santiago forestalled such a disaster, despite a total absence of logistical or tactical planning on the part of the United States.

Still the lesson was obvious: to effectively defend its interests, the United States would have to first reorganize its War Department.[5] In July 1899, President McKinley began by choosing the illustrious lawyer Elihu Root as his new Secretary of War.

Problems and Proposals

When Secretary Root took office, the War Department was burdened by the following defects:

* There was little connection between the staff bureaus and the Army proper.
* There was no central agency to formulate general military policy.

* Officers were permanently assigned to staff duties.
* Coordination was lacking between the various staff bureaus.
* The decentralized system of procurement and supply was extremely wasteful.[6]

Root understood that the lack of organization was the principal problem to be overcome. In his first annual report for 1899, Root outlined two fundamental proposals: the real object of having an Army is to prepare for war; and the Regular Army should not be expected to wage a war without expansion.[7] While he did not recommend the creation of a General Staff, he did set the stage for it in his outline for the reorganization of the War Department. Root proposed that the Department have:

* A planning staff.
* An agency to evaluate changes in military technology.
* A system of selecting and training competent officers.
* A workable Reserve system.[8]

Orchestrated Changes

Root, who had no military experience, wisely avoided the temptation to make wholesale modifications in the War Department, for he realized that changes in such an entrenched organization would have to be carefully orchestrated. To educate himself, he perused the Dodge Commission report on the conduct of the Spanish-American War; absorbed the principles in Spenser Wilkinson's *The Brain of an Army*; and consulted frequently with the Adjutant General, Major General Henry C. Corbin, and his assistant, Major William H. Carter. It was Carter who introduced Root to Emory Upton's *Armies of Europe and Asia* and his influential *Military Policy of the United States*. Upton had written that America needed a German-style General Staff; while Root was in basic agreement, he feared that it would be difficult to adapt the "monarchial" character of the German system to American institutions.[9]

Furthermore, Root correctly surmised that many conservatives within the Army would find repugnant any attempt to modernize the system. Root thus determined that a number of interim steps would be necessary. In February 1900, he tasked a board of officers under Brigadier General William Ludlow with creating an Army War College.

The War College was formally established in November 1901 and was envisioned by its first president, Brigadier General Tasker H. Bliss, as an adjunct of the General Staff ; that is, its students would be more concerned with actually doing something rather than learning how to do it. The establishment of this new system of military education was an important step in the direction of creating a General Staff.[10]

Also in 1901 Root asked Congress to abolish permanent appointments in many of the staff and supply departments, and to establish the doctrine of a 4-year detail of line officers to the staff. Root thereby circumvented the worst aspects of separatism between the War Department and the "field"; he also created a more favorable climate for the General Staff concept by retiring the most conservative, reactionary officers.[11]

General Staff Bill

Early in 1902 Root directed Carter to prepare a General Staff bill for submission to Congress. Introduced in February, the measure aroused intense opposition among many bureau chiefs and other high-ranking officers, including General Nelson Miles, the Commanding General of the Army, who wielded his considerable influence in Congress to defeat any prospect of the bill's passage in that session of the legislature. Only after Root publicized the need for a General Staff with his widely circulated annual report of 1902 did the opposition subside enough to secure the passage of the General Staff Act, as it was known, in February 1903.

The General Staff Act, whose provisions varied in many ways from the original proposals, accomplished several objectives:

* It created a General Staff Corps of officers detailed from the line.

* It tasked the staff to plan for national defense and supervise the majority of bureaus, under the control of the Chief of Staff .

* It dictated how many officers would be on the Staff, and that a tour of duty would be 4 years.[12]

Root himself summarized the purpose of the General Staff as follows:

> . . . first, to acquire information and to arrange it and fit it into all possible plans of operation, so that an order can. be intelligently made, and, second, when the order has been made to exercise constant supervision that does not mean command but to inform and advise the different persons who must conspire to the execution of the order of how every other one is going on with his work.[13]

While the statement is rather obscure, it does indicate Root's intentions that the General Staff both plan and supervise. Unfortunately, in the following years arguments about these functions were to dilute the strength of the concept Root had developed.

Opposition to Reform

Even the supporters of the General Staff were aware of the difficulties facing this new organizational entity. General Adna R. Chaffee, appointed Chief of Staff in 1904, concluded that "some in authority, who had not agreed entirely with the retiring Secretary of War, Elihu Root, in the reforms introduced during his administration were determined upon a reactionary campaign."[14] This of course was expected since the independence of the bureau chiefs had been severely curtailed. But the greatest problems were forthcoming from the Adjutant General, who had previously held great sway with the Secretary of War and had performed many of the duties of the Chief of Staff.

To strengthen his position with respect to that of the Chief of Staff, Major General Frederick C. Ainsworth determined that he would have to improve his own claim to authority. Utilizing the theme of waste resulting from the overlapping duties of his Bureau of Records and Pension Office and the Adjutant General's Office, Ainsworth sallied forth in December 1903 to persuade the Secretary of War to effect

a consolidation. In a letter to *The Army and Navy Journal* Secretary Root, who had recommended prior to his departure from office in August 1903 that the Adjutant General's office be renamed the Office of the Military Secretary, strongly defended the measure to consolidate in the interests of greater efficiency and economy.[15]

However, when the consolidation measure was made public through an amendment to that year's Army Appropriations Bill, a proviso had been added to the Secretary's recommendations. The bill provided "that the officers of said consolidated department shall be subject to the supervision of the Chief of Staff in all matters pertaining to the command, discipline or administration of the existing military establishment." With the political strength he had on Capitol Hill, Adjutant General Frederick C. Ainsworth felt no reluctance in warning Root that the consolidation measure would not pass without the proviso.[16] The measure passed as amended and Ainsworth had won an important victory.

Still, Ainsworth was not done. He further urged the current Chief of Staff, Major General Franklin Bell, to divest the General Staff of many routine tasks assumed by it, finding support again from Root, who wrote:

> I consider it important to avoid imposing on the General Staff duties of an administrative character. . . . I am not now aware of any occasion for this, and speaking generally, I do not think that any of the duties which were left in the Adjutant General's Department should be imposed upon the General Staff. On the contrary, I think that constant watchfulness should be exercised to avoid loading the Staff down with matters which are really administrative.[17]

By the time Bell was succeeded in April 1910 by Major General Leonard Wood, Ainsworth had regained much of the authority formerly held by the Adjutant General's Office. But the real battle was yet to come.

Wood vs. Ainsworth

Like his predecessor, General Wood came to his new position with very definite, preconceived ideas about the War Department. It wasn't long before he realized that Ainsworth was diametrically opposed to further changes in that organization's status quo. Undaunted by Ainsworth's power and influence, and burdened with what he considered inadequate appropriations, Wood set out on a course of effecting administrative economies. The most logical tack, he felt, was to investigate the enormous amount of paper work and the procedures for making returns in the office of the Adjutant General, which he did through an appointed board of officers in December 1910. This prompted Ainsworth to reply that his office was not having "its proper influence in the Department."[18] Wood replied that Ainsworth's bureau would be treated no differently than any other in the Department, and that he had no intention of surrendering any of the duties of the Chief of Staff to a privileged member of one of his bureaus.

The conflict proceeded to worsen. In December 1911, Wood moved to reduce the period of enlistment from three to two years; however, Ainsworth used his

political power to temporarily short-circuit this encroachment on the established system. But the search for economies continued, leading to Wood's recommendation that the muster roll system of Army records be abolished. This was approved by the Secretary of War and on December 15, 1911, Ainsworth was asked for his comments. Finally, in February 1912, after repeated efforts to secure his comments, Ainsworth attacked the entire theory, charging that the proposal was "a subterfuge" such as "would be scorned by honorable men."[19]

Recognizing an opportunity for a key showdown, Wood took the memo to Secretary of War Henry Stimson, who felt that he himself was being attacked. Ainsworth was charged with insubordination and other improper official conduct and was relieved of his duties. Only his political contacts saved him from a court-martial, allowing him instead to retire.

> For Wood it was a notable victory not only because it assured his personal supremacy, but because it assured in the War Department the supremacy of the law over the willful despotism of any individual, and established the conception of the government of the Army which was the heart of Root's plan of reorganization.[20]

Nonetheless, the rift between Ainsworth and Wood plunged the General Staff into the murky waters of partisan political strife.

Secretary of War Stimson and General Wood conceived a plan for reorganizing the Army which included the closing of certain Army posts for whose existence there was little military justification. This so offended several senators that they attempted to force General Wood's removal from his position through an amendment to the Army Appropriations Bill of 1912. Dissatisfied with such Congressional coercion, President Taft vetoed the bill and in turn succeeded in having the bill rewritten without the "personal" legislation. At last the character of the War Department was stabilized.

Conclusion

This decade of controversy had seen a number of fundamental reforms take place in the War Department, but none was more significant than the creation of a General Staff. From a history of impenetrably compartmentalized bureaus which largely ignored the Commanding General had come an era of cautious change in the system.

Root and Carter had conceived of the General Staff as a basic reform to make the Army more responsive to the nation's needs. They theoretically replaced the concept of the Commanding General of the Army with the more restrictive line of authority from the President through the Secretary of War to the field. The General Staff was designed to coordinate actions by the bureaus; it would, moreover, plan for problems rather than wait for them to happen and then react.[21]

While the General Staff Act of 1903 was vague about relationships between the Chief of Staff and the army in the field and with the bureaus, its authors apparently intended it to be so, leaving it to the successive Chiefs of Staff to assert them-

selves. Thus, there was a period when the machine ran less than smoothly. But once the question of the Chief of Staff's authority was settled—for which General Leonard Wood was largely responsible—the General Staff was free to concentrate on formulating the long-awaited military policy of the United States.

Notes

[1] Maj. Marc B. Powe, "A Great Debate: The American General Staff (1903–16)," *Military Review* (April 1975), p. 72.

[2] Brig. Gen. J. D. Hittle, *The Military Staff* (Harrisburg, Pa.: The Stackpole Co., 1961), p. 196.

[3] "Report of the Commission appointed by the President to Investigate the Conduct of the War Department in the War with Spain" (Washington: Government Printing Office, 1899), p. 2157.

[4] Ibid., p. 2158.

[5] Powe, p. 73.

[6] John Dickinson, *The Building of an Army* (New York: The Century Co., 1922), p. 255.

[7] Philip C. Jessup, *Elihu Root* (New York: Dodd, Mead and Co., 1938), pp. 240–243.

[8] Ibid.

[9] Powe, pp. 75–76.

[10] C. Joseph Bernardo and Eugene H. Baron, *American Military Policy: Its Development Since 1775* (Harrisburg, Pa.: The Stackpole Co., 1961), p. 293.

[11] Powe, p. 76.

[12] Ibid., p. 77.

[13] Cited by Otto L. Nelson, Jr., *National Security and the General Staff* (Washington: Infantry Journal Press, 1946), p. 60.

[14] William H. Carter, *The Life of Lieutenant General Chaffee* (Chicago: University of Chicago Press, 1917), p. 268.

[15] Bernardo and Bacon, pp. 299–300.

[16] Washington, Library of Congress, Root Mss., Ainsworth to Root, March 9, 1904.

[17] Jessup, pp. 262–263.

[18] Hermann Hagedorn, *Leonard Wood: A Biography*, 2 vols. (New York: Harper and Brothers, 1931), 2:99.

[19] U. S. Congress, House, *Report on Relief of the Adjutant General of the Army from the Duties of his Office*, H. R. 508, 62d Cong., 2d sess., p. 13.

[20] Hagedorn, p. 123.

[21] Powe, p. 85.

Chapter 7

Logistics of the First World War

42

Army Logistics in Mexico, 1916

Introduction. Maj. George A. Millard describes the logistical operations in support of Brig. Gen. John J. Pershing's Punitive Expedition and draws out the logistical lessons learned by the United States Army in Mexico in 1916. Millard emphasizes the importance of the experience gained in Mexico for subsequent operations in World War I. By so doing he provides a useful preface to the study of Army logistics in the First World War.

The Provocation

The 35-year rule of Porfirio Diaz and his highly authoritarian, centralist police state was broken in Mexico in 1911 by a revolution that would last until 1940. The upheaval wrought by the revolution, as the country was wracked by political assassinations, instability and civil war, made the United States extremely nervous prior to and during World War I.

In 1916, in northern Mexico, the army of General Francisco ("Pancho") Villa fought for control of the area against the federal troops of President Venustiano Carranza. Villa was no ordinary "Frito Bandido." Breaking with the tradition of previous Mexican armies, "Villa was the first man to think of swift forced marches of bodies of cavalry, leaving their women and children behind."[1] Villa struck terror into the enemy by abandoning his bases and railroad lines and throwing his entire army into the field. "He invented in Mexico that most demoralizing form of battle—the night attack."[2]

The United States had settled into a pattern of recognition and good relations with the Mexican government of Carranza. Villa, formerly a Carranza backer, sought to embarrass him by inciting the United States to a point of intervention by conducting criminal acts along the border.

On 11 January 1916, Villa's forces stopped a Mexican train in the northern Mexican state of Sonora and executed 16 Americans who were part of a mining

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engineer assistance group requested by the Carranza government. US President Woodrow Wilson refused to be stampeded into intervention.[3]

Finally, at 0400 on 9 March 1916, Villa led 1,500 Villistas in a raid on the US Army camp and New Mexican town of Columbus, killing eight soldiers and a like number of civilians.[4] In response to the public outcry, President Wilson gained Carranza's permission to send a punitive expedition into the northern provinces of Mexico to capture or destroy Villa and his army.[5]

The Expedition

Major General Frederick Funston, commanding general of the US Army's Southern Department at Fort Sam Houston, Texas, was directed on 10 March 1916 to send a force to punish Villa. It was to be commanded by Brigadier General John J. Pershing (junior in rank, senior in age, but with more political clout than Funston).

On 15 March 1916, Pershing led a cavalry-heavy force that would eventually amount to almost 10,000 Regular Army troops across the border in pursuit of Villa and his forces.[6] A force this large was not difficult to muster. A large portion of the Army was already stationed in and patrolling the border region in anticipation of hostilities.

President Wilson heeded General Funston's advice and immediately called elements of the National Guard of Arizona, New Mexico and Texas into federal service. With the National Defense Act of 2 June 1916 confirming his actions, Wilson eventually mobilized portions of the National Guard of all states.[7] In all, 254,314 National Guardsmen were mobilized for duty on the Mexican border although none of these units crossed over into Mexico.[8]

The force started out in two columns from Hachita and Columbus, New Mexico, and thrashed around the state of Chihuahua in various formations of from one to four columns in search of Villa. It received spotty support from the Mexican railroad out of Juarez and alternately fought Villistas and federal troops of the Mexican government. Despite the protocol issued by Carranza, the Mexicans grew embarrassed by the US intervention, and the Mexican people, as well as the army, became extremely hostile toward the US Army.

By mid-April, the operations stretched as far south as Parral and 400 miles from Columbus. The Army then withdrew to form a headquarters at Colonia Dublan and five districts fanning southward, each forming an area of operations for a cavalry regiment.[9]

This early 20th-century "pacification' program was an attempt to ferret out Villa and his forces by intelligence and patrolling operations throughout northern Mexico. However, it eventually degenerated into a prolonged and embarrassing "watchful waiting" period for the US Army as Villa avoided capture and the United States and Mexico never went to war.

This article does not attempt to describe the events or maneuvers of the expedition, but deals with the logistical aspects of the campaign.

Logistical Support of the Expedition

General Pershing had witnessed the logistical disaster of the Spanish-American War, and much of what he saw in Columbus on 14 March 1916 reminded him of Tampa, Florida, in 1898. Although Lieutenant Colonel Thomas H. Slovens was the senior quartermaster officer on the expedition, Pershing immediately appointed Major John F. Madden, Quartermaster Corps, at Fort Bliss, Texas, the chief quartermaster for the Punitive Expedition. Captain Everett S. Hughes, Ordnance Department, was appointed acting ordnance officer for the expedition.

Madden, who arrived at Columbus on the evening of 15 March was left the following order:

> Progress must not be hampered by lack of supply. Take charge, get organized, and send supplies forward to whatever advanced bases might be established.[10]

Catching Villa depended on fast-moving cavalry columns which would have to be supplied along a lengthening line of communication. The Mexican railroads would prove unreliable, and "Good roads and good supply men were the keys to success."[11]

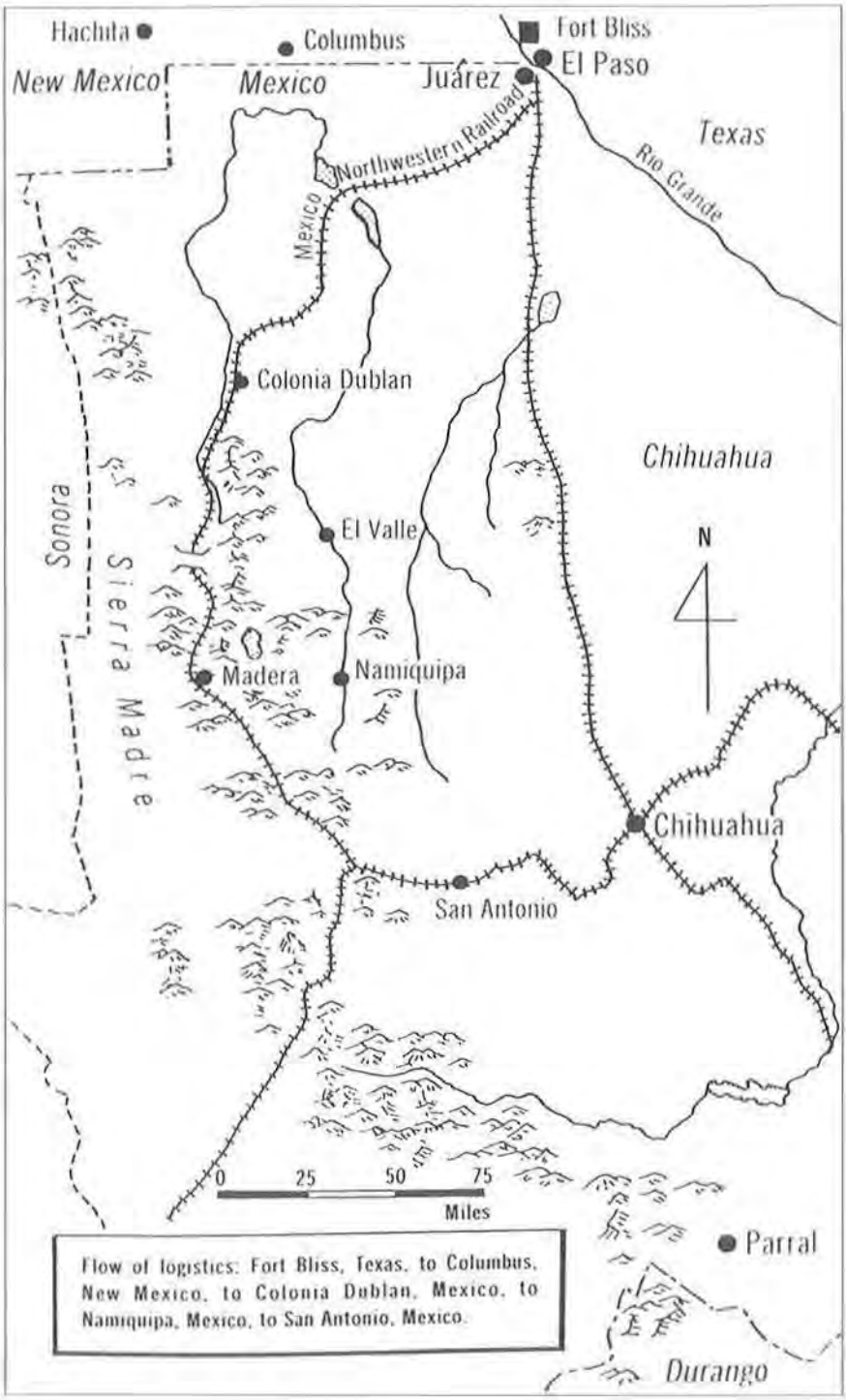
In 1916, Columbus, New Mexico, was a typical border town supporting a cattle raising community of some 500 inhabitants with a mission church, a general store and a single railroad siding to handle shipments of small amounts of cattle. The devastation of the Villa raid had rendered the facilities of the town practically wiped out.[12] By 14 March, troop units were arriving from various places looking for camp sites, supplies, orders and somebody in charge. Trains chuffed into the "railhead" and shunted boxcars galore onto the siding, their contents unmarked and unknown.[13]

> Trucks of various makes were hurriedly sent to Columbus in every conceivable state of unreadiness, with no adequate equipment for assembling them, and no organization for their management.[14]

Wagons were shipped not only disassembled, but incomplete. Major Madden had officers detailed to him "for Quartermaster duty only to confess total ignorance of forms, material, transportation, ration ratios, forage requirements, the barest rudiments of logistics."[15] By all military standards, the town was a mess. Perhaps the most extreme reaction was that of a young officer replacement documented as follows:

> Ordered to report to a barren, inhospitable base camp on the Mexican border, Lt. Zell alighted from his train, took one look around, and cried out, 'Great God! Is this Columbus, New Mexico?' A few minutes later Zell shot himself in the head, inflicting a fatal wound.[16]

But Madden was determined, and he mustered a battalion of the 20th Infantry designated for service at the base and the bands of the several cavalry regiments that were marching off to glory. Initially, these troops, and eventually


Hachita
Columbus
Fort Bliss
El Paso
New Mexico
Mexico
Juárez
Texas
Northwestern Railroad
Rio Grande
Mexico
Colonia Dublan
Chihuahua
Sonora
Sierra Madre
El Valle
N
Madera
Namiquipa
Chihuahua
San Antonio
0
25
50
75
Miles
Parral
Flow of logistics: Fort Bliss, Texas, to Columbus, New Mexico, to Colonia Dublan, Mexico, to Namiquipa, Mexico, to San Antonio, Mexico.
Durango

large gangs of civilian laborers hired out of El Paso, Texas, were set to work unloading, classifying and shipping the rations, forage and equipment under his supervision.

Large numbers of civilian laborers presented other problems. Adding to the difficulty of the situation, men arrived penniless, without clothing and blankets to protect them, and had to be fed, sheltered, equipped and disciplined.[17] Eventually, two more railroad sidings were constructed. Pershing stated:

> Notwithstanding all this confusion and congestion, it was not long before supplies were moving to the front and, in the end, of course, these difficulties were overcome, but under other and more pressing circumstances, it might not have been possible.[18]

The main supply route (MSR), which was finally established, ran from Fort Bliss, Texas, to the base depot at Columbus, New Mexico, to the intermediate depot at Colonia Dublan to the advanced depot at Namiquipa to another advanced depot at San Antonio. Various-sized temporary subdepots were established throughout the area to support operations of short duration.

This chain of depots, or supply and maintenance points, supported units on an area basis for rations, forage, equipment, maintenance, remounts and veterinary service. However, support was limited during the first two months of the campaign by the transportation means available and the tendency of the cavalry to outrange their logistics. General Funston was responsible for the flow of supplies into the base depot and General Pershing for the depots forward of Columbus.

Medical support and evacuation was from the regimental aid stations to the mobile field hospital whose location was shifted throughout the expedition with the flow of action. A fixed field hospital was located at Colonia Dublan to support the headquarters, mobile field hospital and regiments. Each field hospital was supported by a horse-drawn ambulance company. A cantonment hospital with a medical supply depot was established at Columbus, and the most serious cases were evacuated by rail to the base hospital at Fort Bliss.

Unlike the Spanish-American War, the average rate of sickness for the expedition forces was only 3 percent. The greatest single problem was drinking water. This was solved, however, by sinking a sufficient number of wells at base camps to provide pure water and extensive use of lister bags and chlorinization.[19]

The terrain and climate of Chihuahua were more hostile than the citizens. The Mexican state is an arid plateau rising from north to south from 3,000 to 6,000 feet in elevation where food and forage are scarce. The western part of the state features the Sierra Madre Mountains towering to 10,000 feet where water, food and forage are more available but hazardous mountain passes make them inaccessible to a pursuing army.[20]

The country itself was an enemy, searing hot by day and freezing cold by night. General Funston declared, "There is no part of Mexico which is more poorly mapped than the northwest section of Chihuahua."[21] These conditions took their toll daily on men, horses and equipment.

Transportation

The initial supply columns were organized by Major Madden. They were formed from the 1st and 2d US Army Wagon Companies and several 1½-ton trucks gathered from the El Paso depot of the Quartermaster Corps, the Border Patrol and the 1st Aero Squadron which was detailed to support the expedition out of Fort Sam Houston.[22] (The 1st Aero Squadron was the first airplane unit to serve the US Army in combat, performing daring reconnaissance missions until all eight of its aircraft were wrecked by the end of May 1916).

Although wagon and pack animals were used extensively in the regimental field trains, the big story in army logistics during this period was the development of the truck. Practically no motor trucks were available to the Army at the beginning of the expedition. But, owing to the emergency, the War Department authorized the hire of such trucks as might be available and civilian chauffeurs to drive them.[23] However, by 22 March, Pershing was down to four trucks still operable and was asking Funston for anything that could move.[24]

Funston's pleas to the War Department met with immediate action. Without congressional authorization, General Hugh Scott, chief of staff of the Army, ordered $450,000 to be spent by the quartermaster general for trucks. When he informed his boss, Secretary of War Newton D. Baker (who had just taken office on 9 March 1916), of his actions, Scott was told not to worry, "If anybody goes to jail, I'll be the man."[25] Between 20 March and 31 July 1916, 17 truck companies were formed and put into service from Columbus. These units were manned by civilian chauffeurs and mechanics but commanded by Army officers (usually Regular Army captains).[26]

Although put into service more as a replacement for the railroad than the wagons or pack animals, it became evident to Pershing that the truck was to become the most efficient method of transportation in the Army. Recommendations for development of a standard vehicle, and an all-military unit to operate it, came out of the expedition.

The roads along the MSR were rutted, powdered dust during the dry season and quagmires during the rainy season in Chihuahua. The engineers supporting the supply convoys had to build and repair roadways constantly, and in excess of half a million dollars was expended in the first four months to keep the MSR open.[27]

Armored cars also made their appearance in the field with the US Army at this time, proving their worth and, even more, the quick-response capability of the motor industry. Within 22 hours after receiving a telephone order for 27 armored cars, the Packard Motor Car Company had the cars on the way by special train with a civilian driver and mechanic for each car shipped. The vehicles arrived at Columbus 51 hours after leaving Detroit.[28] According to Pershing, the successful handling of supplies by truck convoys for a force operating over a long line of communication was developed to a degree never before attained by the US Army.[29]



Truck Convoy with the Pershing Expedition to Mexico, 1916

General Supplies and Support

With priority of shipments out of Columbus given to the supply of forage and rations, fortunately general supplies and equipment never became a major problem. Ammunition was never in question due to the low intensity of the conflict. The Army had replaced the *Gatling* gun in 1909 with "the mediocre light Benet-Mercie machine gun."[30] This weapon was subject to jamming but was the standard armament of the regimental machinegun platoons in 1916. Although the British-made *Lewis* machinegun had tested with favorable results by the Army 10 years prior, it had never been adopted.

Due to the climate and extended use, such items as saddle blankets and halter tie ropes became minor problems, and maintenance and repair shops sprang up at each base camp.[31] The arid country caused the horses to suffer intensely when ridden more than 30 miles a day.[32] Both horses and men wore out their shoes in a short time. Horseshoeing was part of the forward maintenance support package, and the unsuitability of the trooper's light shoes and leather leggings led to the adoption of a heavier field shoe for the men.[33]

The administrative supply accountability deemed necessary for peacetime garrison proved ineffective. The regiments did not possess the time nor personnel to extend such a system to the tactical situation when operating for months and hundreds of miles from their "garrison" in Columbus.

> General Pershing pestered his logistical staff until, at last, traditional requisitions were scrapped in favor of simple signature issues and memorandum receipts for depot needs.[34]

Forage and Rations

The tactical class III of the horse cavalry was forage. Forage and rations were the most serious logistical problems of this campaign. During the early days of the expedition, cavalry units would strike out with less than five days of forage and rations in their pack trains and would not be resupplied for a month. Lack of transportation, the continual change in the situation and fluctuation in the number of troops at different points along the line of communication often led to there being too much at one location while too little at another.

Troops and mounts actively engaged in the pursuit of Villa literally lived off the country.[35] Fortunately, beef could be procured or confiscated locally, as well as some beans and corn. At first, quartermaster receipts were accepted as a means of exchange, but the natives soon grew reluctant to part with their products for mere "scraps of paper." Officers were reduced to supporting their units with personal funds out of pocket. Colonel William C. Brown, commanding the 10th US Cavalry, contributed around $1,500 at one point. And, except for their makeshift procurement arrangements, some units would not have made it as far south as they did.[36]

Units spent considerable energy and time sending out foraging parties to obtain their own rations and forage. These "inoffensive patrols" resulted in some surprises. On 14 May, First Lieutenant George S. Patton with several troopers set out for Rubio by automobile to purchase corn for forage. It was on this mission that they jumped a band of Villistas and killed three, including a Colonel Cardenas, a member of Villa's Staff.[37] The story is that Patton brought back the bodies strapped like deer on the fenders of the autos.

On 25 May, an eight-man foraging party of the machinegun platoon, 17th US Infantry, accompanied by two engineers and a supply sergeant, were hunting cattle when they clashed with a Villista band. Although suffering casualties, they killed Colonel Candelario Cervantes who was considered the right hand of Villa.[38]

The grain ration allocated per horse was 10 pounds per animal, and this was supplemented by hay or alfalfa, so the tonnage involved was considerable.[39] Nevertheless, the supply situation began to turn around by mid-April, and, when operations were reduced to "districts," the situation greatly improved.

Logistical Limits on Key Operations

Logistical restrictions did limit operations on at least two critical occasions: once, when the expedition was closest to Villa and, again, when it was farthest extended. On 29 March, Villa was wounded from a clash with federal troops and roughly a day ahead of Colonel George F. Dodd's 2d Cavalry Brigade when he attacked the Villistas at Guerrero. The attack was successful in breaking up and Villa's scattering forces. Pursuit was in order, however, in Dodd's own words:

> The command was practically without supplies. There was little forage and for days the only food available had been fresh beef, frijoles and parched corn. We were not equipped for the intensely cold weather, even the canteens of water froze solid.[40]

The horses could not pursue.

By 12 April, the bulk of Pershing's forces had converged on Parral. Extended operations to hold that area were desired, but local hostility and logistics necessitated withdrawal. As Pershing reported:

> To supply such a force with the transportation then available would not have been an easy task. These rapidly moving columns had out run the means of supply and, as there was neither food nor forage obtainable in that district, withdrawal was the best solution to the problem.[41]

The Withdrawal

Between the end of May and early September 1916, Pershing consolidated his forces in the vicinity of Colonia Dublan. The line of communication was shortened and logistics simplified as the US Army settled into an extended period of "watchful waiting" on both sides of the border for the war that never developed. Pershing, by now promoted to major general, used the next five months for a period of intensified training. Finally, on Sunday, 5 February 1917, the last unit recrossed the border back into the United States, and the expedition was at an end.[42]

The lessons learned during this period were significant to the Army as the limitations of horse cavalry were contrasted with the capability of the truck and airplane. The exercise of the Defense Act of 1916 "was the first such mobilization of troops in the United States Army and provided experience that proved of great value."[43] The value to readiness and training of the National Guard units and their association with the Regular Army during this period was productive. The logistical problems for both elements surfaced early, and many were solved. However, as one author has written:

> The real significance to the United States of operations in Mexico was that they served as rehearsal and preparation—within less than a year the United States was called upon to undertake the greatest overseas expedition in history to help turn the tide in the World War then raging in Europe.[44]

Notes

[1] James W. Wilke and Albert L. Michaels, *Revolution in Mexico: Years of Upheaval, 1910–1940*, Alfred A. Knopf Inc., N.Y., 1969, p 74.

[2] *Ibid.*

[3] Robert Leckie, *The Wars of America*, Harper & Row Publishers Inc., N.Y., 1968, Volume II, p 102.

[4] Robert S. Thomas and Inez V. Allen, *The Mexican Punitive Expedition* (Draft), Department of the Army, Washington, D.C., 1954, p I–14.

[5] Robert B. Asprey, *War in the Shadows: The Guerrilla in History*, Doubleday & Co. Inc., Garden City, N.Y., 1975, Volume I, p 245.

[6] Frank E. Vandiver, *Black Jack: The Life and Times of John J. Pershing*, Texas A & M University Press, College Station, Texas, 1977, Volume II, p 624.

[7] Thomas and Allen, *op. cit.*, pp I–7 and I–8.

[8] Colonel Frank Thompkins, *Chasing Villa*, The Military Service Publishing Co., Harrisburg Pa., 1934, pp 226 and 269; and Colonel H. A. Toulmin Jr., *With Pershing in Mexico*, The Military Service Publishing Co., Harrisburg. Pa., 1935, p 126.

[9] John J. Pershing, *Report of the Punitive Expedition*, Headquarters, Punitive Expedition, US Army in the Field, Colonia Dublan, Mexico, 1916, pp 25–26.

[10] Vandiver, *op. cit.*, p 609.

[11] *Ibid.*, p 611.

[12] Pershing, *op. cit.*, p 57.

[13] Vandiver, *op. cit.*, p 608.

[14] Pershing, *op. cit.*, p 34.

[15] *Ibid.*; and Vandiver, *op. cit.*

[16] K. Bruce Galloway and Robert S. Johnson Jr., *West Point: America's Power Fraternity*, Simon & Schuster Inc., N.Y., 1973, p 160.

[17] Pershing, *op. cit.*, p 58.

[18] *Ibid.*, p 34.

[19] *Ibid.*, pp 38–39.

[20] Thomas and Allen, *op. cit.*, pp II–13 and II–14.

[21] Donald Smythe, *Guerrilla Warrior: The Early Life of John J. Pershing*, Charles Scribner's Sons, N.Y., 1973, pp 221–22.

[22] Pershing *op. cit.*, p 60.

[23] Thomas and Allen, *op. cit.*, p II–10.

[24] *Ibid.*, p III–24.

[25] Smythe, *op. cit.*, p 221.

[26] Pershing, *op. cit.*, p 66.

[27] *Ibid.*, pp 40–41.

[28] James A. Huston, *The Sinews of War: Army Logistics, 1775–1953*, The Superintendent of Documents, US Government Printing Office, Washington, D.C., 1966, pp 298–99.

[29] Pershing, *op. cit.*, pp 34–35.

[30] Huston, *op. cit.*, p 297.

[31] Pershing, *op. cit.*, p 77.

[32] *Ibid.*, p 8.

[33] Thomas and Allen, *op. cit.*, p IV–8.

[34] Vandiver, *op. cit.*, p 650.

[35] Pershing, *op. cit.*, p 35.

[36] Thomas and Allen, *op. cit.*, p III–25.

[37] Pershing, *op. cit.*, p 28.

[38] *Ibid.*, p 29.

[39] *Ibid.*, p 63.

[40] Thomas and Allen, *op. cit.*, p III–7.

[41] Pershing, *op. cit.*, p 23.
[42] Vandiver, *op. cit.*, p 667.
[43] Thomas and Allen, *op. cit.*, p P–1.
[44] Huston, *op. cit.*, p 305.

43

Industrial Mobilization for the First World War

Introduction. Maj. Gen. Theodore Antonelli, a former Commandant of the Industrial College of the Armed Forces, surveys the difficulties encountered in America's military mobilization for World War I and concludes that we were "granted the luxury of an applied education in the techniques of large-scale modern warfare without having to pay the full tuition." He notes that, despite problems of planning and organization, American industrial mobilization proceeded creditably and that the First World War ended before we reached our potential production peak.

Any mention of the phrase "industrial mobilization in World War I" at the Industrial College of the Armed Forces (ICAF) is likely to stir institutional memory, for it was in the aftermath of that turbulent and generally frustrating experience that ICAF had its beginning. One of the many measures taken after the war to ensure that "next time" the undertaking would be better managed was the establishment, on February 25, 1924, of the Army Industrial College (predecessor of today's Industrial College of the Armed Forces) with the mission of training officers for a future wartime procurement organization and conducting studies in the problems of industrial mobilization.

America Unprepared

The United States came late and unprepared into history's first "total" war. Inhibited by deep-seated isolationist, pacifist, and *laissez-faire* traditions, and with no previous experience of the insatiable demands that a prolonged modern war imposes on an industrial economy, the country struggled for a year and a half to transform its great industrial strength into warmaking power and to bring it to bear against the enemy. Years later an ICAF commandant recalled some of the highlights of the effort:

Reproduced from Theodore Antonelli, "American Industrial Mobilization During World War I," *Defense Management Journal* 12, no. 3 (July 1976): 40–46.

> At literally millions of firesides throughout the nation veterans told of the surprising absence of made-in-America equipment at the front. It was learned that even the traditional Springfield rifle, standard in the Armed Forces since 1903, was conspicuous by its absence in the combat areas, and that most of the men actually carried a hastily rechambered version of the British Enfield. American arsenals and factories were able to ship only 145 of the famous 75 mm field guns to France before the end of the fighting, and our troops were obliged to use French and British artillery almost exclusively. The antiaircraft artillery production of the United States, from the beginning of the war emergency to Armistice Day, had been limited to one lone gun. No American fighter or bomber aircraft ever saw action. American tanks shipped overseas before the Armistice numbered just 16, of which 10 were of the three-ton type. However, the Army was able to procure 7,000,000 pairs of spurs and 366,528 gas masks for horses.[1]

In retrospect, these anomalies now seem less surprising than they did at the time. Despite its enormous potential power, the country could hardly have been less prepared for the undertaking into which it plunged in April 1917. To direct the military effort, for example, the Army General Staff had, under the National Defense Act of 1916, an authorized strength of 41 officers, of whom only 19 were permitted to be stationed in Washington.[2] Its powers over the 13 bureaus which handled the Army's administrative operations were very limited, and the bureaus themselves had decentralized much of their business, making superior control difficult. There were 9 different systems for estimating requirements, 5 systems of property accountability, 10 agencies handling War Department money accounts, and 5 systems of fiscal accounts.

Five of the bureaus—the Quartermaster, Engineer, and Signal Corps, and the Ordnance and Medical Departments—had supply responsibilities, and three more were created during the war: the Construction Division, Chemical Warfare Service, and Bureau of Aircraft Production. The division of supply responsibilities among the bureaus was a product of archaic tradition. The Signal Corps, for example, besides purchasing equipment related to signals, was also responsible for certain classes of blankets, horse equipment, vehicles, and even aircraft. The Ordnance Department, besides arms and ammunition, also procured part of the soldier's individual equipment, including a blanket for his horse (but not his own blanket). What the other bureaus did not buy for themselves or for each other, the Quartermaster Corps bought for all. And each bureau handled its own distribution and storage from the beginning to the end of the supply conduit.

On the eve of the declaration of war the Army had no detailed plans for organizing and equipping large forces, nor even the mathematical factors and formulas that would enable it to do so under given assumptions. Studies made that spring of the materiel requirements for a force of one million men indicated lead times from 9 months to 2½ years for outfitting a force of that size.[3]

Limited Industrial Preparedness

Three important steps, vital to the subsequent mobilization of industry, had been taken in 1915–16. One was the establishment by Congress in 1916 of the U.S. Shipping Board, empowered to buy or build $50 million worth of merchant shipping suitable for use as naval auxiliaries, to operate shipping lines, and to regulate rates and services of all vessels engaged in American commerce. It was to become the foundation of the modern merchant marine. At that time the United States possessed only six percent of the world's total of 35 million tons of shipping, less than half of which consisted of useful seagoing ships. The second step involved the privately financed Committee on Industrial Preparedness of the Naval Consulting Board established in 1915, and the Kernan Board, created by the Secretary of War the year following, which had begun a comprehensive inventory of the nation's munitions capacity.[4] Most important of all was the establishment in August 1916 of the Council of National Defense, from which, in one way or another, most of the wartime organization for mobilizing industry was to spring.

President Wilson's new Secretary of War, Newton D. Baker, had urged him several months earlier to create such a council, and the National Defense Act of 1916 provided statutory authority for him to do so. Curiously enough, this authority was never invoked. It was not an executive order but an Army appropriations act which finally brought the Council into being, with a membership consisting of the Secretaries of War, Navy, Interior, Agriculture, Commerce, and Labor.[5]

The Council itself was only one of several high-level bodies created in 1915 and 1916 which were clearly designed to think and plan, but not to act. It was the Council's potent appendage, an Advisory Commission of prominent dollar-a-year men from the business, scientific, and labor communities that, in the waning months of neutrality in 1917, evolved the basic pattern of the later wartime organization: a system of committees and subcommittees consisting of leaders and experts from specific sectors of industry, to each of which a member of the Commission was assigned as a continuing point of contact. These committees were the germ cells of many of the World War I "superagencies." Working quietly behind the scenes, the Advisory Commission, as an indignant critic later told a House committee on military expenditures, "designed practically every war measure which the Congress subsequently enacted . . . weeks and months before the Congress of the United States declared war against Germany."[6]

The War Industries Board

In the spring of 1917, the Council spawned its first offspring, the General Munitions Board, to coordinate the buying of the Service bureaus. The Board lacked authority, however, to compel the purchasing departments to clear their orders through the Board or to assign and enforce priorities, and soon became top-heavy with committees. At the end of July it was superseded by the seven-man War Industries Board, which eventually became the nerve center of the entire munitions program. The Board's basic function was to ensure an adequate flow of materials

to the Armed Services, the shipping and railroad programs, and the Allies, with minimum deprivation to the civilian economy. Its approach was control at the source—facilities, materials, fuel, transportation, labor—while leaving the procurement and delivery of finished items to the established agencies.

At the top, the Board was organized into large functional or activity-group departments, such as priorities, conservation, conversion, price-fixing, and the like. The operating structure consisted of some 60 commodity sections, each headed by a chief recruited from the industry concerned but without a financial interest in the industry. The commodity sections, covering the spectrum from raw materials to finished products, dealt with their respective segments of industry through a parallel system of "war service committees representing private industry."[7]

For the first seven months of its existence the War Industries Board lacked the authority to enforce its coordinating function. Not until March 4, 1918, did the President take the first important step, naming Bernard Baruch as chairman with a final voice and firm Presidential backing in all decisions except in the field of price-fixing (which was left to an interagency committee). The other agencies, in turn, could wield against recalcitrant producers the power, under wartime legislation, to commandeer materials and facilities. While potentially the autocrat of the whole war effort through its control of the key ingredients used in the production of munitions, the Board remained only *primus inter pares*. Baruch was admonished by the President "to let alone what is being successfully done," and the other superagencies, such as the Food, Fuel, and Railroad Administrations, remained sovereign in their respective fields. The Military Departments were allowed to determine their own requirements and deal directly with suppliers.[8]

War Department Reorganization

The War Department meanwhile was putting its own house in order. During 1917 the supply bureaus ran wild in an orgy of competitive buying, haphazardly commandeering plants and materials (sometimes even one another's), and expanding their establishments beyond any peacetime imagining. The General Staff itself grew to a strength of over 1,000 officers by the end of the war. Late in 1917 Secretary of War Baker called in two experts from the business world, E. R. Stettinius and Benedict Crowell, the former to serve as Surveyor General of Supplies, the latter as Assistant Secretary of War. Stettinius soon went to France on another mission, but Crowell became the key figure in a reorganization of the War Department whose basic theory prevails today.

Fundamental to the reorganization, which went on through most of 1918, was the clarification of the General Staff's authority to "supervise" the bureaus since under the National Defense Act of 1916 it was prohibited from engaging in "administrative" functions.

In April 1918 a new "superoperating" agency was created in the General Staff, the Purchase, Storage and Traffic Division. This agency absorbed most of the functions of the Quartermaster Corps—transportation, fiscal control, storage and supply of most articles of a commercial or nontechnical nature, comprising the

great bulk of military supplies. The head of the new agency, Major General George W. Goethals, was also the Acting Quartermaster General. The new division also computed all Army supply requirements and supervised the activities of six of the eight supply bureaus.

The centering of all this "civilian-type" business in the General Staff was to some degree a subterfuge. Assistant Secretary Crowell was given the title of Director of Munitions and effectively controlled War Department policy in that vast area. In effect, General Goethals had two masters, the Chief of Staff (General Peyton C. March after March 1918) in military matters and the Assistant Secretary in industrial matters. Formally, however, the channel of communication between Goethals and Crowell was through General March, who consistently maintained that *all* Army business should funnel through the General Staff to the Secretary.[9]

America's Supply Role

There was a widespread expectation in spring of 1917 that formal belligerency would mean continued selling of munitions to the Allies and little else. Even among the military the general view was that, given the lead times needed to mobilize, train, and equip large forces for deployment to Europe, the projected American role would be "solely naval and economic." As industrial mobilization bogged down in the summer and fall, it looked as though even economic participation would be both limited and late.

The idea of a more specialized role for America began to take form. Cargo space was becoming scarce as German submarine depredations decimated Allied shipping. Britain and France, with a huge capacity for producing munitions, lacked raw materials and semifinished components to keep their plants operating at full capacity. In most types of munitions, materials and components required much less shipping space than finished items. All this suggested that the United States should concentrate on producing and shipping overseas raw and semifinished materials and components to be manufactured into finished munitions.

Meanwhile, military reverses in 1917, culminating in the collapse of Italian armies at Caporetto in October and the effective elimination of Russia by the Bolshevik revolution in November, accentuated the necessity for early deployment of American troops to France. That summer the 1st Division crossed the Atlantic to "show the flag" on the Western Front, and by September a program had been developed to send almost 1.5 million troops by the end of 1918, organized in 30 divisions and 5 corps. Late in 1917 an American mission headed by Colonel House arrived in London to discuss collaboration. Allied leaders first begged for troops and then for shipping, naval forces to combat the German submarines, food, money, and credit, in that priority. For most munitions the Allies had no immediate need; indeed, they were prepared to outfit American divisions as they arrived with almost all they required. From America they wanted, most immediately, propellants and high explosives.

The discussions of November and December 1917 gave the approval to the 30-division program looking to deployment of about one million troops by the end of

1918, along with various other measures of collaboration. American industry could now mobilize methodically for the long haul, looking to full-scale military participation in 1919 and 1920.[10]

The Winter Crisis

Coincident with the nadir of Allied military fortunes in late 1917, America experienced its own crisis on the home front. All through 1917 war orders poured into the "northeastern corner" (north of the Potomac and east of the Alleghenies), glutting this industrial heartland. The railroads, victims of 15 years of cumulative deterioration resulting from rising operating costs and stabilized rates, were unprepared to carry this shipping load. Shippers were under no restraint in forwarding freight and roads were under none in accepting it; competition was a spur to both. There was no single agency that could set priorities for overseas shipments, and while the voluntary Railroads War Board, representing the country's leading roads, could and did impose embargoes from time to time, military agencies could usually secure exemption for their shipments, comprising most of the traffic.

The result, in the dreadfully cold winter of 1917–18, worst in a century, was complete paralysis. The movement of fuel and materials into the area, and of finished goods out of it, choked and came to a stop. The demand for power swamped existing plants. Two million tons of freight (44,320 carloads) sat idle for months. At New York Harbor, 200 freighters waited at the docks, lacking both cargo and fuel. All export programs sagged, especially food shipments, resulting in serious shortages and deprivation in Britain and France in February 1918. Cargo shipments to the American Expeditionary Force (AEF) shrank by one-third from December 1917 to January 1918.

In December 1917 the Government seized the railroads and, at a high cost, ran them efficiently for the remainder of the war. The War Department set up its own Inland Traffic Service the following month to control rail movement of all Army export freight. The National Railroad Administration adopted essentially the same system through a committee of traffic experts representing all major shipping agencies. The counterpart of this machinery in the shipping sphere was the Shipping Control Committee set up by the Shipping Board in February to pool all U.S. merchant shipping.

Gradually the traffic paralysis subsided, but the setback to industrial mobilization was severe and of longer duration, although the precise effects cannot be measured. The most evident consequence was a sharp reduction during 1918 in the output of pig iron, steel ingots, and steel rails, basic essentials to war production, at a time when production had been expected to reach its peak.[11]

Industrial Performance

It is difficult to relate the performance of American industry in 1917 and 1918 to the system of controls developed to guide and stimulate it, simply because the system was so late in maturing. A full-fledged system of priorities did not go into

effect until July 1918. A usable inventory of manufacturing facilities and a proficient statistical system to keep data current were not developed until spring of 1918. Steel, one of the most critical commodities, was brought under almost absolute control, but not until July 1918. The automobile industry, one of the heaviest users of steel, was not forced to curtail passenger car production until mid-1918. Despite an acute shortage of coal, which the Fuel Administration had been unable to overcome, rationing for coal for domestic users was not instituted until that year. An elaborate machinery of labor conciliation and mediation was created and regulation of hours, wages, and working conditions instituted in 1917 and 1918; Samuel Gompers, head of the American Federation of Labor, proclaimed an industrial truce for the duration and the labor committee of the Council for National Defense endorsed the principle of mutual forbearance by management and labor, but strikes played a part in the disastrous crisis of the following winter. Prices were regulated, although the desire to spur production usually overrode that of stabilizing the economy. Extensive economies were realized through mostly voluntary conservation.[12]

In the vital category of munitions, American factories produced impressive quantities during the 19 months before the Armistice, but the bulk of the output, concentrated in the spring and summer of 1918, reached its recipients too late to be used. The total included 2.5 million rifles, 182,000 machine guns and automatic rifles, 2.9 billion rounds of rifle and machine gun ammunition, 632 million pounds of smokeless powder, and 376 million pounds of high explosives. The output of rifles and smokeless powder exceeded that of either major ally during the same period; only France out-produced America in machine guns and automatic rifles.[13]

Artillery was a special problem. In June 1917 arrangements were made with the French and British for them to outfit new American divisions with artillery on arrival overseas. Later divisions would be equipped with American-manufactured artillery of standard British and French types. Serious problems were encountered in American plants in translating French specifications and in manufacturing certain components, particularly hand-crafted recuperators for the famous French 75mm field guns. The feat was accomplished, however, and the first recuperator was manufactured in July 1918. In all, however, less than 2,000 complete artillery pieces were produced in the United States before the Armistice. British output was more than twice as large, and French output about five times as large. However, in 1914 there were only two private artillery manufacturers in the United States; by November 1918 the number had swelled to 19.[14]

In April 1917 the Army had about 1,400 machine guns of all types, and only two American firms had ever manufactured these weapons in quantity. In May a special board recommended adoption of the new Browning machine gun and automatic rifle, but production was delayed for a year. Enough were shipped to France before the Armistice to outfit the AEF, but few were actually used.[15]

The United States entered the war with a reserve of 600,000 Springfield 1903 rifles, probably the best weapon of its kind in the world, and about 160,000 old Krags of Spanish-American War vintage. Three American plants were, however,

already turning out British Enfields in large numbers; this was a recently improved model, though not as good as the Springfield. It was decided to redesign the Enfield to take .30 caliber ammunition, and the first of the redesigned weapons were delivered in late summer of 1917.[16]

One of the more substantial American contributions was in merchant shipping, especially significant because of the heavy losses of Allied tonnage to German submarines. American shipyards turned out some 300,000 deadweight tons of shipping for the Allies in 1916, but available capacity fell far short of the expected need for 6–10 million tons per year. In April 1917 an emergency building program was launched with the establishment of the Emergency Fleet Corporation, which took over 431 steel ocean-going vessels contracted for by the British and other clients. In all, contracts were placed for 2,851 additional steamships, totaling over 15 million tons; they included more than 1,000 wooden ships, 50 of composite steel and wood construction, and 43 of concrete. The number of building ways was increased six-fold, and some $3 billion were poured into the program. As in other areas, the net product before the Armistice was disappointing. Only 107 of the 1,741 new steel ships contracted for were completed, and the nonsteel ships proved generally of little use. The net result of the emergency building program was about 470 new ships, enough to about double the existing fleet. Fortunately additional tonnage was acquired from neutral and enemy shipping in American harbors.[17]

Summary

Overall, the performance of American industry in this conflict must be judged creditable in the light of the base of inexperience and lack of preparation from which it started, and particularly when one takes into account the fact, often overlooked, that the Armistice intervened long before production in most lines was expected to reach its peak. In a longer war American industry might have "dazzled" the world as it did in World War II.

For the United States, World War I was a preview of the full reality of modern "total" war. In both this and the later world conflagration, the American people were spared the kind of devastation and bloodshed inflicted on most of the other participants. In World War I they were also spared the kind of economic and social regimentation that surely would have been imposed had the war demand ever approached the real limits of the nation's material and human resources. In effect, the country was granted the luxury of an applied education in the techniques of large-scale modern war without having to pay the full tuition. Therein lay the chief value of the monumental, chaotic, largely mismanaged mobilization of American industry in 1917 and 1918.

Notes

[1] Brig. Gen. E. B. McKinley, "The Industrial College of the Armed Forces," *The Quartermaster Review*, March–April 1949, p. 30.

[2] Otto L. Nelson, *National Security and the General Staff* (Washington: Infantry Journal Press, 1946), p. 217.

[3] Grosvenor B. Clarkson, *Industrial America in the World War* (Boston: Houghton Mifflin, 1923), pp. 111–13; Nelson, pp. 227–29.

[4] William F. Willoughby, *Government Organization in Wartime and After* (New York: D. Appleton & Co., 1919), pp. 69–70, 143–48; Clarkson, pp. 12–13; Bernard M. Baruch, *American Industry in the War: A Report of the U. S. War Industries Board* (Washington: Government Printing Office, 1921), p. 19.

[5] Clarkson, chap. II.

[6] Clarkson, p. 24; Baruch, p. 20.

[7] Baruch, pp. 22–24; Clarkson, pp. 40–49; Willoughby, pp. 72–74.

[8] The President's instructions of March 4 to Baruch were confirmed and strengthened by an executive order on May 28 and the Overman Act of May 20 authorizing the President to redistribute functions among executive agencies. See Baruch, pp. 24–29; Willoughby, pp. 74 ff; Clarkson, pp. 48–64.

[9] See Nelson, pp. 217–71; Benedict Crowell and R. F. Wilson, *The Armies of industry: Our Nation's Manufacture of Munitions for a World in Arms*, 2 vols. (New Haven, Conn.: Yale University Press, 1921), 1: chap. 1; Maj. James C. Longino, *et. al.*, *A Study of World War Procurement and Industrial Mobilization* (Washington: Army Industrial College, 1939), pp. 90–102.

[10] See Crowell and Wilson, vol. 1, Introduction, and vol. 2, chap. XXXIV; Clarkson, chap. 1; David F. Trask, *The United States in the Supreme War Council* (Middletown, Conn.: Wesleyan University Press, 1961), chaps. I and V; Longino, pp. 78–82.

[11] See Walker D. Hines, *War History of American Railroads* (New Haven, Conn.: Yale University Press, 1928), pp. 39–40 *passim*; Longino, p. 93; Clarkson, pp. 324–25 and chap. XVIII; Willoughby, chap. VIII.

[12] See Clarkson *passim*.

[13] Leonard P. Ayres, *The War with Germany: A Statistical Summary*, 2d ed. (Washington: Government Printing Office, 1919), p. 145; Crowell and Wilson, vols. 1 and 2 *passim*.

[14] Ayres, chap. VI; Crowell and Wilson, vol. 1, chaps. III through VII; James A. Huston, *The Sinews of War: Army Logistics 1775–1953* (Washington: Office, Chief of Military History, 1966), pp. 323–24.

[15] Huston, pp. 321–23; Ayres, pp. 65–68; Crowell and Wilson, vol. 1, chap. X.

[16] Huston, pp. 320–21; Ayres, pp. 63–64; Crowell and Wilson, vol. 1, chap. XI.

[17] Willoughby, chap. VII; Ayres, pp. 39–40; Longino, pp. 183–86.

44

World War I Allied Industrial and Economic Cooperation

Introduction. Benedict Crowell, Assistant Secretary of War and Director of Munitions during World War I, summarizes the achievements of American industry in supplying the wherewithal for Allied victory during the war, with particular emphasis on logistical cooperation among the Allies. He also addresses the degree to which Allied strategy was influenced by logistical capabilities and describes the results achieved by Allied industrial and economic cooperation.

The reader who has come to this point has before him the picture of the Nation's industry at war—the whole teeming effort in its main outlines, its myriad ramifications, its boundless activity, its ten thousand enterprises, its infinite toil, its hosts of workers, its wonders of scientific achievement, its attainments, even its failures—in short that humming complex of work, planning, ambition, disappointment, triumph, shortcomings, ability, and driving force which was a mighty people concentrated with all of its powers upon a single objective.

It remains now to describe the place occupied by this effort in the whole strategic plan of the war against Germany. We did not go into the struggle as if we expected to fight a single-handed war. Whatever we did either with military personnel or with munitions we did with reference to what the nations associated with us were doing or could do in the same respects. The whole plan was coordinated more or less perfectly, and these international understandings and agreements touched and influenced even the most trivial of our enterprises.

The reader who has in mind the record set down on the preceding pages is now prepared to comprehend the force and extent of the international cooperation in the war and to judge how well America played her part in the general scheme. Let us go back, therefore, and review the history of these agreements.

For many months before America came into the struggle, England, France, and Italy had been engaged in grappling with the scientifically organized forces of

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Reproduced from Benedict Crowell, *America's Munitions, 1917–1918* (Washington, D.C.: Government Printing Office, 1919), pp. 585–92.

German military autocracy. The world war had become a conflict of materials, almost as much as of men. All participants had mobilized their industrial resources in a manner and to an extent undreamed of in times of peace.

The allies had marshaled all available raw materials and factory production in their own lands, and still faced colossal deficiencies in supplies for their military programs. They had been forced to reach out into the markets of the world to meet these deficiencies. They had come to America and placed huge orders for raw materials and finished products. The normal capacity of America's peace-time production had been insufficient to meet their overwhelming needs.

In August, 1914, the total factory capacity in the United States for the manufacture of powder was 6,000,000 pounds a year. In April, 1917, under the stimulation of orders placed by the allies, the capacity had been increased more than sixtyfold. England, France, and Italy were taking this entire production and asking for more. They had absorbed our entire output. A huge stream of materials, supplies, and ammunition was flowing steadily from America to the front line trenches in France. The allied governments had moulded their military programs in reliance upon the continuation of this source of supply. Their troops were on the front and in contact with the enemy. Failure of supply meant disaster.

The flow of materials from America to the armies in France could not, under any circumstances, be interfered with or curtailed. This fact was promptly recognized by the United States, and the allied governments were assured that America's military program would be formulated and performed without interference with the allied programs of supply from this country.

America's industrial contribution to the war, as a nation, was to be over and above the industrial contribution to the allies then being made by our individual producers. This fundamental plank in the interallied platform of cooperation was laid down at the very commencement of America's preparation, and it was strictly adhered to until the end of hostilities.

A comprehensive cooperative plan for America's industrial participation in the war remained to be worked out. A survey had to be conducted of the new partner's strength and weakness in supply. A determination had to be made of what the allies could give to the new partner, and what they must receive from her. This was done by the Interallied Munitions Council sitting in Paris, by the foreign missions in Washington in conference with the War Department, and by the allied war ministries and Gen. Pershing abroad.

An analysis of the facts of the situation disclosed that:

A. The world over—

(1) There was a critical shortage of ocean tonnage which promised to become more critical as time passed on account of the success of German submarine operations.

B. In France and England—

(1) The output of factories was being seriously curtailed and limited by lack of raw materials and semifinished products.

(2) If an adequate supply of raw materials and semifinished products

could be made available, the factories had a substantial surplus manufacturing capacity which could be placed at the disposal of the United States.

C. In the United States—

(1) A surplus of raw materials and semifinished products for transport to France and England could quickly be made available.

(2) It would be impossible, within less than a year, to build up additional manufacturing capacity in the United States sufficient to supply a large army.

The lack of ocean tonnage was recognized by all as the vitals of the problem. France, Italy, and the United States had comparatively little merchant tonnage. England's vast tonnage was suffering rapid depletion by submarine losses and was totally inadequate to meet allied needs. Ships were the biggest single deficiency in the interallied program.

The cooperative industrial program of the Allies and the United States had to be geared into the shipping problem. To do this the determination of what materials should be shipped from the United States had to be decided first on the basis of what economies could be effected in shipping space. If raw materials for aircraft occupied less cargo space than the finished product, the maximum utilization of available tonnage demanded the shipment to France of these raw materials to be made into the finished product there. If, on the other hand, finished nitrocellulose powder for artillery shell propellants, or finished picric acid for artillery shell explosives, occupied less cargo space than the raw component materials used in their production, the shipping shortage demanded manufacture of these explosives and propellants in the United States. Not a single ship could be freighted with an extra pound or cubic foot of cargo which by any effort could be saved.

The French Mission in the United States early recognized this fact and urged the manufacture in the United States of picric acid to be used as explosive in 75-millimeter and 155-millimeter shell, pointing out that the finished product occupied but one-nineteenth as much cargo space as the raw materials.

Gen. Pershing recognized the point, and in August, 1917, cabled as follows:

> A joint French-American commission has examined the question of the production in France of powders and explosives and reports as follows: France must import by December 4 the greater part of the raw materials used in the manufacture of powders and explosives. The weight of raw materials required is 10 to 20 times the weight of the finished product. The shipping situation is such that by December the output of France will be limited by the amount of raw material produced in France or easily obtainable. . . . The present outlook is that in December the French output will not be more than half of the present output. To avoid calamity the United States must not only furnish powder and explosives for all of its own forces but must supply about half of the French requirements. It is therefore recommended: (A) that the United States Government furnish all powders and explosives needed for present contracts with French Government; (B) that the United States Government prepare to furnish by December 300 tons per month of

> explosives and 200 tons per month of powder for French consumption; (C) that study be immediately commenced for the purpose of adapting American powders to French cannon of different types, this study to be made both in the United States and in France by competent experts; (D) that the French Government put at the disposition of the American Government competent experts both in the manufacture and use of these powders in the guns. . . .

Subsequent computations made on this side of the ocean indicated that in the case of picric acid and other explosives this ratio between raw materials and finished product in bulk was too great, yet in principle these computations did not affect the desirability of shipping the finished product rather than the raw materials.

Again, Gen. Pershing cabled to the Chief of Staff in the United States urging the purchase of completed artillery, artillery ammunition, and airplanes abroad, in order that "saving of tonnage" might be effected, and pointing out the saving of cargo space resulting from the shipment to France of raw materials instead of finished products, saying:

> Following is comparison in tonnage of the principal manufactured articles of ordnance obtained in Europe and the replacements in raw materials contracted for the same. All tonnage ratios shown are in favor of raw materials:

Field Artillery guns	1 to 7½
155 millimeter howitzers and ammunition	1 to 1¼
8 millimeter ammunition	1 to 3⅝
Trench mortars	1 to 12½
Grenades	1 to 4
In airplane production:	
Packed airplanes, in weight	1 to 2
Packed airplanes, in cubic capacity	1 to 2½
Packed airplanes in area covered by boxes on board ship	1 to 9

In the above comparison in the ammunition item, finished explosives are regarded as raw materials.

The Interallied Munitions Council, sitting in Paris and containing among its membership the best military and industrial brains at the command of the allied cause, including Gen. Pershing, Gen. Robertson, chief of the imperial general staff of Great Britain, and Gen. Foch, then chief of the general staff of the French Army, came to the same conclusion, and Gen. Bliss transmitted its findings in a memorable cable, a part of which was reproduced in the preface to this report.

Every mind was in accord. Tonnage must be saved. It could be saved and in vast amounts by calling upon the United States to supply the raw and semifinished materials, and upon the French and British war factories to utilize these raw and semifinished materials in the manufacture of the finished products.

But could this solution of the vital shipping question be dovetailed into the industrial situations of the various nations concerned? Could the United States

supply the essential raw and semifinished materials in quantities equivalent to the amounts consumed in the manufacture of the finished product? Did the French and British factories, with these materials laid down in their yards, have available a sufficient manufacturing surplus to supply the needs of their own armies and also to produce in part for the armies of America?

The foreign missions were in Washington. They knew intimately the economic and industrial situations in their respective countries; they knew the military plans of their general staffs; they knew in what respects their programs of supply for their armies in the field needed assistance, and in what respects these programs could be met or exceeded. With this information available, they were prepared to furnish the answer as to the manufacturing capacities of allied Europe.

The British War Mission in Washington communicated to the War Department a cable from the British minister of armament, setting out the position of the British Government on reciprocal supply:

> The British Government is willing as far as possible in matters of urgency to manufacture for use of the Americans any products necessary to the more speedy equipment of the Americans that the Americans consider they can obtain in England more promptly or better than in the United States. Furthermore, the situation as to manufacture of steel products is better than it has been. The British Government will help to its utmost ability without making actual and immediate replacement of raw material an indispensable condition when any order is given. On the other hand the general principle of replacements of raw materials as soon as possible should be observed. It has become more a question of furnishing supplies promptly to the allies than a mere question of replacing what has been furnished American troops; in other words, the needs of the allies should be considered as one, and England should manufacture for the allies anything that is necessary or best got that way, and America should in the general interest of the allies furnish as soon as convenient raw material to replace that used. . . .

Writing to Maj. Gen. Crozier, Chief of Ordnance, the French high commission urged the placement in France of orders for artillery and artillery ammunition and pointed out the existence of surplus factory capacity available for their production. The commission summarized the industrial situation in France in the following language:

> Even in such remarkable technical conditions as yours, it takes time to realize such a program, to organize manufactures and to have men to direct them. You will take less time than we did in France, where the output of big guns was not adequate to our needs before the end of 1916. But time—more or less—had to be an essential factor, so that after careful consideration, it has been found that the only plan to be carried out in order to supply the first American divisions with material on their landing in France was to avail ourselves of the surplus capacity of pro-

> duction of the French factories, which had been since the beginning of the war very powerfully equipped and were able to turn out greater quantities than those corresponding to our supply of raw material.

The allies could deliver the artillery, artillery ammunition, and airplanes if America could deliver the raw and semifinished materials. America answered that she could and would produce and transport to Europe raw materials and semifinished products in amounts equivalent to the amounts consumed by allied factories in manufacturing the completed guns, shell, and airplanes.

The details remained to be worked out. The French high commission submitted statements showing the amounts of each component material consumed in French factories in the production of guns and ammunition of the various calibers. There were to be supplied by America 6 tons of steel for each 75-millimeter gun, 40 tons of steel for each 155-millimeter howitzer, and 60 tons of steel for each 155-millimeter gun, and proper proportionate amounts of necessary materials used in the manufacture of artillery ammunition.

The program of industrial and economic cooperation between the United States and the allies thus took form. It used in the most efficient manner every nook and cranny of every available ship. It utilized to the utmost the surplus manufacturing capacity of France and England. It brought into the war at the earliest moment the resources of America in raw and semifinished materials. It spanned the period during which America could go forward with her gigantic mobilization of manufacturing power and later convince the Central Empires of the futility of further struggle.

With the program mapped out, reciprocal agreements for supply remained to be made. Orders were promptly placed.

The United States ordered from France a total of 5,854 pieces of field and trench artillery of various calibers, of which 3,834 were delivered to the American Expeditionary Forces prior to the armistice.

By August, 1917, more artillery ammunition was on order with the French Government than was fired by the American Expeditionary Forces from January 18, 1918, when the first complete American division entered the line, until November 11, 1918, when the end of hostilities was announced to the world. Of the amount ordered 10,000,000 rounds were delivered before firing ceased.

In aircraft equipment, the French factories also had a surplus capacity and delivered to Gen. Pershing up to November 11, 1918, a total of 4,881 finished airplanes.

By the terms of our agreement with the French Government, America obligated herself to supply the raw materials and component parts of the finished products delivered to our forces in France. This agreement America performed twice over. For every ton of raw materials and semifinished products America agreed to furnish to France, she furnished two tons. According to French statements, our replacement obligation in raw materials was 350,000 tons. America furnished over 800,000 tons.

In exchange for the artillery and artillery ammunition of French manufacture fired by Perishing, America supplied to France in metals alone over 700,000 tons

of steel, 30,000 tons of pig iron, 5,000 tons of brass and spelter, and 50,000 tons of copper.

In addition, and for use in the artillery ammunition received from French factories, America manufactured and supplied to France in a finished state all the principal materials used in loading all shell delivered to the American Army. These materials consisted of smokeless powder, used as a propellant to drive the shell from the guns, and of picric acid, used as a high-powered denotative to burst over the enemy lines. The French used 12,000 tons of smokeless powder in our shell. America delivered an equivalent amount of finished powder. The French consumed 18,000 tons of picric acid in loading shell for American use. America supplied 18,500 tons.

In exchange for the finished airplanes, again America supplied the raw materials and component parts. For the framework of the French planes driven by American aviators, America furnished 34,500,000 feet of spruce, fir, and cedar, enough to manufacture over 16,000 finished planes; for the propellers, America furnished 7,000,000 feet of mahogany and walnut, enough for 40,000 propellers; 4,000 tons of aluminum, enough for thousands of planes; and dopes for painting airplane wings, and miscellaneous aircraft materials and supplies far in excess of the number of finished planes delivered to Gen. Pershing. Under special contract made in August, 1917, and in addition to the above, America furnished to France all materials for 5,000 finished planes and all parts for 8,500 finished airplane engines, which were to be assembled in France for the American Expeditionary Forces. The engine parts were in forgings and needed only to be machined. For the use of the French Government in machining these engine parts, America built and delivered the necessary equipment and machinery.

Thousands of additional smaller items of all kinds were supplied by the various governments to each other from day to day. No deficiency in the military programs of any of them was permitted to exist, if it could be made good by any of the others.

All of America's vast contribution to the allied program of supply was not only produced in America, but it was taken to France in army transports. From August, 1917, to November 11, 1918, an average of 2,000 tons of American materials for French factories left American ports every day aboard American army transports. Through a submarine-infested ocean, in which the Germans sank over 21,000,000 tons of dead-weight shipping, these materials were carried in army transports manned by American crews, and laid down at the doors of French factories.

By February, 1918, Gen. Pershing estimated that 2,000,000 tons of cargo space had been saved by the adoption of this program of international and reciprocal supply, a saving of more tonnage than was then available for the use of the American Expeditionary Forces. The Franco-American commission on explosives estimated a reduction of 75 per cent in cargo space in the shipment of explosives alone.

So the silent drama of international cooperation was carried out. The story of British and American mutual aid during the war is the same story in substance as that of Franco-American cooperation, with changes only in the figures. Economy

of shipping was effected. British and French factory capacity was utilized. The vast reservoir of American raw materials and explosives was thrown against the enemy. International cooperation on a scale and in a spirit of cordial, mutual helpfulness, such as the world had never dreamed of, helped to equip 2,000,000 American soldiers in France.

And it was done, all of it, without curtailment of the huge stream of material which was flowing from America to the allies when the United States entered the war. France and England received ever-increasing quantities to the last day. The more than 800,000 tons of replacement materials for artillery, artillery ammunition, and airplanes delivered to America was over and above the millions of tons secured by the allies for their own use directly from American producers.

It was partly by reason of the adoption of this program and its complete performance that Gen. Pershing, after the armistice, could say:

> During active operations extending from January, 1918, when our first division entered the line, until the close of hostilities on November 11, our troops were supplied with the equipment and ammunition necessary to carry their work to a successful conclusion.

Beyond all this, our Government, as part of the interallied program, created vast facilities for the manufacture of supplies which England, France, and Italy still required for their own needs and which a comprehensive consideration of the entire program, with particular reference to shipping, showed could be best produced in this country. Factories for the production of immense additional quantities of picric acid, powder, and other materials were built by our War Department to fill the deficiencies in the military programs of our associates in the war.

And beyond and behind all this America went forward with her own gigantic preparations for the conquest of the dark forces which threatened world civilization. It was this mobilization of her might almost as much as the effect of her immediate force which helped to convince the German general staff of the futility of further resistance and assisted to bring the war to an early end.

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Organization of the Quartermaster Department in World War I

Introduction. Historian Roy A. Shaw describes the contributions of Acting Quartermaster Generals George W. Goethals and Robert E. Wood and their assistant Robert J. Thorne in overcoming the difficulties of planning, organizing, and coordinating the activities of the Quartermaster Department in World War I. He particularly emphasizes the changes in organizational structure introduced by Goethals and Wood to overcome problems encountered at higher levels in supporting a large and complex Army in overseas operations.

During 175th anniversary celebrations of the past year at Quartermaster installations and Quartermaster Association meetings throughout the world, many speeches were made and much was written honoring an organization whose beginning antedates the birth of the Republic, and those who have served as Quartermaster General of the Army.

Though Quartermaster Corps history is replete with outstanding achievements of, and under, many Quartermasters General, some of the brightest pages record achievements by and under Maj. Gen. George W. Goethals and Brig. Gen. Robert E. Wood (who served as Acting Quartermaster General during the most crucial period of World War I), and Robert J. Thorne, Assistant to the Acting Quartermaster General under both.

Even a digest of these achievements by a qualified historian, with access to complete official records, would fill a large volume; here I will attempt to present only a few personal notes, an outline of Corps organization and functions from April 6th to mid-December 1917, and the part played by General Goethals, General Wood, and Mr. Thorne in Quartermaster Corps history.

General Goethals, world-renowned builder of the Panama Canal, retired in November 1916, but soon after General Pershing was designated overseas com-

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George W. Goethals

mander, on May 26, 1917, asked for assignment under him. General Goethals was then serving, at President Wilson's request, as General Manager and Director of the Emergency Fleet Corporation, and was not recalled to active duty until December, when, to his surprise, he was asked to accept appointment as Acting Quartermaster General. The appointment was made December 19th, and reaction at home and overseas is illustrated by a message he is said to have received from former President Theodore Roosevelt: "I congratulate you, and thrice over I congratulate the Country."

Training and experience preeminently qualified him for the task. After almost four years at City College, New York, which he entered at the age of fifteen, he was appointed to the U. S. Military Academy and graduated Cadet Captain, in 1880, without a single demerit—a record said to have been made by General Robert E. Lee and but few others. Commissioned second lieutenant, Corps of Engineers, he remained at the Academy as an assistant instructor until October, when he became a student officer at what is now Fort Totten. Next were assignments to Vancouver Barracks, where he served under General Nelson A. Miles and was selected by the then General of the Army, William Tecumseh Sherman, to accompany him on an inspection of posts in the Northwest; duty as assistant in charge of Ohio River improvements, and as assistant professor in civil and military engineering at West Point; duty on the Cumberland and Tennessee Rivers in construction of locks and dams, during which period he was promoted to first lieutenant, captain, and engineer-in-charge; duty as Assistant to the Chief of Engineers in Washington; service during the War with Spain in Cuba and Puerto Rico as temporary lieutenant colonel; as instructor in Practical Engineering at West Point; and, in 1900, as commander of the U. S. Engineer Department District of New York.

He was a member of the first permanent Army General Staff, established in 1903, (other members were Captains John J. Pershing and Peyton C. March, personnel of the War College), and served as secretary of the National Coast Defense Board, accompanying Secretary of War Taft on tours of inspection of fortifications on the Atlantic and Pacific, usually on ships of the Navy. In 1905, then a lieutenant colonel and still a member of the General Staff, he made a tour of inspection of the Panama Canal Zone, which led to appointment, in 1907, as Chief Engineer in charge of construction, Chairman of the Isthmian Canal Commission, and, in

1909, promotion to the rank of colonel. From January 1914 to September 1916 he was Governor of the Panama Canal, and shortly after appointment, on March 4th, was voted the thanks of Congress and promoted from colonel to major general.

The problems of supply—requirements, procurement, storage and distribution, transportation on land and water, personnel, and organization—were not new to General Goethals.

When the United States entered World War I, on April 6, 1917, the Office of The Quartermaster General consisted of five divisions: Administrative, Finance & Accounting, Construction & Repair, Transportation, and Supplies. Under the Administrative Division was a branch called Estimates, Reserve Depot & National Defense Branch, which controlled administration of general supply depots and apportionment of appropriated funds. The functions of the Office of The Quartermaster General were largely administration and management of personnel. The operating units were in the field: Department Quartermasters, attached to the staff of Department Commanders, and depot, camp, post, and other subsidiary Quartermasters. The Department Quartermasters were responsible for supply of troops within their Departments and controlled all requisitions and estimates from subsidiary Quartermasters. The depot Quartermasters, on the other hand, procured and stored supplies, and issued them on requisition from Department Quartermasters. Although the depots had a prescribed form of organization and procedure, modeled after the Office of The Quartermaster General, they varied in characteristics and acted independently of one another. Few purchases were made by Office of The Quartermaster General personnel, and there were few records in Washington of purchases made in the field.

One Corps historian refers to this set-up, which dated back to a consolidation of the Paymaster, Commissary, and Quartermaster Departments in 1912, as "a sort of centralized decentralization." The Corps' chief duties were to clothe, equip, feed, and pay the Army. It also served as a catch-all for such duties as were not specifically assigned to other independent Corps or Departments—Engineers, Signal, Ordnance, Medical—reporting direct to the Secretary of War.

Adequate though this set-up seems to have been up to April 1917, the story from there on was quite different, and the following eight months saw many changes—among them removal, wholly or in part, of purchase functions to the Council of National Defense and the Food Administration and removal of cantonment construction to what became known as the Construction Division, reporting direct to the Secretary of War and eliminating the Construction & Repair Division. Transportation was taken over by a separate embarkation service, which consolidated with a General Staff division, first known as the Storage & Traffic Service, and was probably the beginning of what is sometimes referred to as "the period of Staff supervision."

When an official and factual history of the Quartermaster Corps in World War I is written, and the reasons for these many changes—which were, to put it mildly, demoralizing—are thoroughly explored, the writers will not, it is assumed, overlook the facts that, for several years, Congress had appropriated less than was requested, and needed, to build up reserve stocks; that, early in March 1917, the

Chief of Staff had been informed that National Guard mobilization for service on the Mexican border had practically exhausted reserve stocks; that, as late as the fall of 1917, there was no fixed Army program, and that no approved strength tables, which could be used as a basis for requirement figures and procurement, were furnished the Office of The Quartermaster General during 1917.

Chiefly as a result of criticism from overseas, a Congressional investigation was under way when General Goethals was asked to accept appointment as Acting Quartermaster General, and he did so only after Secretary of War Baker had assured him full authority—and that he would not be interfered with. He took over on December 26th, and a few days later was appointed Director of the Storage & Traffic Service, which again brought all Quartermaster functions, except cantonment construction (which he did not want) under one head.

With loss of functions the Quartermaster Corps had suffered a loss of personnel—commissioned, enlisted, and civilian—and organization was the first problem demanding attention. Believing the Army's business could best be handled by businessmen, he filled gaps and built with and around a number of highly trained executives and specialists in fields parallel to Quartermaster activities. Some of these men were commissioned—the rank of major was the highest authorized. Some, by special authorization of the Secretary of War, were paid salaries (barely large enough for expenses), and some were dollar-a-year-men, most of whom never collected the dollar.

One of the latter, and one of the first to volunteer, was Robert J. Thorne, a graduate of Cornell University, class of 1897, who forged his way first to management of a branch house and then to presidency of one of the country's two largest mail-order and merchandising companies. He had just the organizing, requirements, purchasing, warehousing, and distribution experience necessary to deal with the existing Quartermaster problems, and was destined for a role in Quartermaster Corps history never before, or since, played by a civilian.

Determination of the actual supply situation was necessary before coordination and efficient functioning of the Office of The Quartermaster General and field service could be accomplished, and this task was assigned to Mr. Thorne, as Director of Maintenance & Distribution. His chief assistants were a group of young officers and civilians, with business experience and inquiring minds, who had gone into the Office of The Quartermaster General during and following an investigation made only a few weeks before by outside storage and distribution experts and who had been assigned to handle overseas cables, calculate requirements, coordinate depot and storage facilities, and figure raw material requirements and tonnage space for overseas shipments.

This group, which on its own initiative had been going over all overseas cables and checking orders against shipments, brought into being the then new concept of requirements, based on numerical strength, basic data tables of fundamental allowances, and expected life of equipment. Largely on the basis of their findings and recommendations, functioning reorganization was under way by mid-January 1918—a feat considered little less than miraculous by those with first-hand knowledge.

By January 26th, purchasing had been taken away from outside agencies, and under Office Order No. 202 the organization was divided into two classes: first, the service bureaus, as they were then called, which included General Administration (of which Finance & Accounting was a branch), Personnel & Planning, and Quartermaster Supply Control; second, operating divisions, which included Supply & Equipment, Subsistence (which notwithstanding inadequate information and other handicaps had operated efficiently from the beginning of the war), Reclamation, Fuel & Forage, Remount, and Motors. All of these bureaus and divisions worked so closely with the Storage & Traffic Service of the General Staff that they were practically one.

Hoping to obtain more information as to contemplated draft calls and overseas troop movements, General Goethals and Mr. Thorne made it a point to improve liaison with the General Staff and outside agencies during these weeks, but the results were so disappointing that they arbitrarily increased orders for practically all items, particularly clothing. Not until February 26th—almost eleven months after our entry into the war—was the first approved strength table issued by the Chief of Staff. This table covered the period from March 1st to December 1st, 1918, and showed the number of men to be drafted each month, forces in the United States, overseas troop movements, and total number in the A.E.F.

A big step forward had been made, but General Goethals and Mr. Thorne believed the figures too low and changed them to provide initial equipment for draftees seven or eight months before they were to be called. That their judgment was sound is evidenced by the fact that the strength table of February 26th called for 967,000 in the United States and 1,150,000 in the A.E.F.—slightly over 2,100,000, by October 31st—and the total on November 11, 1918, was approximately 4,000,000, of whom more than 2,000,000 were overseas.

From General Goethals down, practically every one was on the job from early morning to late at night, seven days a week, by this time, and more trained executives and specialists were urgently needed. To obtain them, appeals were made through those then in the organization, and direct. The following telegram is typical of the latter: "You are needed for important work Quartermaster Corps. Can you come to Washington at once to talk it over with us?"

Signed "Goethals per Thorne."

Few, very few, said "no."

The next few weeks saw changes and developments of utmost importance to the Quartermaster Corps and the Army as a whole. Reorganization of the General Staff had been under way since early February, and on March 4th, General Peyton C. March, who had been Chief of Artillery, A.E.F., and had first-hand knowledge of needs overseas, became Chief of Staff. March 2d—two days before—Robert J. Thorne, who had been General Goethals' chief assistant since early January, was officially designated Assistant to the Acting Quartermaster General. The order, under which he is said to have been given more "direct power" than any civilian connected with the War Department other than Secretary Baker and Assistant Secretaries Crowell and Stettinius, reads in part:

> . . . will have the administration and control of such matters pertaining to the Quartermaster General's office and the Quartermaster Corps as may be delegated to him from time to time by the Acting Quartermaster General. Instructions and orders given by Mr. Thorne in the operation of his duties as Assistant to the Acting Quartermaster General will have the force and effect as if performed by the Acting Quartermaster General in person.

About the middle of March the first consolidated requisition for Quartermaster supplies, even including such items as office supplies, was received from overseas, and a further reorganization of the Office of The Quartermaster General was launched. The new set-up, which, with few exceptions and changes of division and branch names, was to function until the signing of the Armistice, is outlined on a chart, dated March 21, 1918, headed *Key Chart—General Organization of the Quartermaster Corps*. As under Office Order No. 202, there were two classes—all designated Divisions. The Service Divisions "performing administrative, planning, or other functions . . . to assist The Quartermaster General, and the several operating divisions . . . in the performance of their duties," were Administrative, Personnel, Finance & Accounts, Methods Control, and Supply Control. The Supply Control Division, which had Requirements and Distribution branches, prepared data showing quantities of Quartermaster supplies of each kind for "the Army as a whole" to be distributed for equipment, maintenance, and reserve stocks; obtained space required for movement of supplies by rail and water; issued purchase authorizations, subject to approval by the Acting Quartermaster General or the Assistant to the Acting Quartermaster General, to procurement divisions; controlled distribution of supplies, maintained reserve stocks, and cooperated with procurement and depot divisions, and the General Staff, in movement of supplies to ports of embarkation. The Chief of Supply Control Division served as representative of the Office of The Quartermaster General on "priority of war materials" to the Council of National Defense and the War Industries Board.

The Operating Divisions, which had to do directly with the procurement, production, and distribution of Quartermaster supplies, were Supply & Equipment, Subsistence, Fuel & Forage, Remount, Motor Transport, and Depot. All of these divisions were subdivided into branches and had units and personnel in the field.

Not until a month later, in Office Order No. 376, April 16, 1918, were the functions of each division and branch specifically set forth and the personnel in charge officially designated. This was also the date on which the Purchase, Storage, & Traffic Division of the General Staff came into being, with General Goethals as Director and Assistant Chief of Staff. This, in the months to come, took control and supervision of purchasing by the Army as a whole (having as a chief objective the consolidation of purchasing in the corps or department already purchasing most of a particular supply item) and of storage and land and water transportation, and had much to do with later Quartermaster Corps developments. Its creation was the result of protests by General Goethals, dating from almost his

first day as Acting Quartermaster General, to the effect that, though coordination in the handling of Army supply problems had been a major objective when the General Staff was created in 1903, coordination was practically non-existent. The Quartermaster Corps, Corps of Engineers, Ordnance Department, Signal Corps, and Medical Department were not only competing for many items—from office supplies to clothing, hardware, harness, and trucks—but each was rushing supplies from factory to storage or ports without arrangement for storage or overseas shipment, wasting manpower, hard-to-get materials, and money, and idling scarce freight cars. General Goethals had been endeavoring to remedy this situation but little progress was made until General March became Chief of Staff.

As Director of Purchase, Storage, & Traffic, General Goethals was in the anomalous position of giving orders to himself as Acting Quartermaster General, but this was to last less than two weeks. His chosen successor as Acting Quartermaster General, Brig. Gen. Robert E. Wood, had been brought back from overseas with first-hand knowledge of needs there, and was quietly familiarizing himself with the situation at home. The first published announcement that he had been appointed, and had "assumed the duties of Acting Quartermaster General of the Army" is believed to have appeared in a Washington newspaper on Sunday morning, April 28th.

Graduating, in 1900, from the U. S. Military Academy—where Captain Goethals had been his instructor in practical military engineering—Wood was commissioned second lieutenant of Cavalry and was sent almost immediately to the Philippines, where he participated in some of the toughest field service during the insurrection. Next he was assigned to Fort Assiniboin, Montana (1902–3); then as instructor at West Point (1903–5). He served during the construction of the Panama Canal, from 1905 to 1915, as Assistant Chief Quartermaster, Chief Quartermaster, and Director of the Panama Railroad Company. In July 1915 he retired, as major, by special act of Congress, and became assistant to the president of a nationally known corporation. After brief service in early 1917 as Purchasing Agent of the Emergency Fleet Corporation, under General Goethals, he went overseas as a lieutenant colonel of Infantry in the 42nd (Rainbow) Division, was promoted to colonel, and, on return to the United States, to brigadier general.

When General Wood took over as Acting Quartermaster General he was only thirty-nine years of age, but if any questioned the wisdom of the appointment they soon learned that the Corps had never had a clearer-thinking or more dynamic leader. Mr. Thorne, then only forty-three, continued as Assistant to the Acting Quartermaster General.

It has been said that "the period of Staff supervision" continued during the time General Goethals and General Wood served as Acting Quartermaster General, and that the Quartermaster Corps had actually been "absorbed" in special divisions of the General Staff. There was "Staff supervision" after General March, a great soldier and executive, became Chief of Staff, for then, and only then, the General Staff began to function as originally intended. If "absorbed," the personnel of the Corps, from top to bottom, was blissfully ignorant of the fact. An illustration is action by General Wood when presented with a General Staff plan

and a Quartermaster plan for establishment of the Army's first training school for technicians in the then new art of autogenous welding and cutting of metals. He told the Quartermaster officers who had been studying the subject that if they did not like the General Staff plan to go ahead with their own—and they did.

During these months many changes had been made, or were under way, in the field. Among them were a closer tie-in with Washington; functional changes; expansion of storage facilities by enlargement and new construction. An early move of great importance was establishment, under the Clothing & Equipage Division, of a Quartermaster office in Boston, with branches in Philadelphia, Chicago, San Francisco, and Portland, Oregon, authorized to control all raw wool in the country. Another was the partial elimination of Department Quartermasters, and, in March, the placing of Depot Quartermasters in full charge of all Quartermaster work of supply depots.

Control of purchases and distribution had, of necessity, been centralized, but knowing that purchasing too rigidly centered left undeveloped many of the country's resources, General Goethals, Mr. Thorne, and certain qualified personnel in the Office of The Quartermaster General and in the field had been studying, and experimenting with, enlargement of authority and responsibility of selected general supply Depot Quartermasters.

General Wood participated in the later stages of this study, and one of his earliest and most far-reaching decisions brought into being the "zone system." The general plan was first outlined by him at a conference in Mr. Throne's office, on May 8th, with Depot Quartermasters from New York, San Francisco, St. Louis, Atlanta, Jeffersonville, Chicago, and Philadelphia, and with the chiefs of the Supply Control and Depot Divisions. This was followed, on May 13th, by a memorandum to all field supply depots and all divisions of the Office of The Quartermaster General, defining functions and assigning zones of jurisdiction to certain general supply depots, as, for instance, New Hampshire, Vermont, Massachusetts, Maine, and Rhode Island to the Boston Depot. Each Depot Quartermaster was instructed to ascertain production facilities within his zone, recommend to the Office of The Quartermaster General qualified producers, submit recommendations for purchase, and be prepared to purchase when so directed. His responsibilities included inspection, follow-up of production, and acceptance of product. Depot Quartermasters were also instructed to divide their zone functions, when possible, among their subdepots. As in the case of wool purchases, this memorandum also initiated the policy of establishing offices in the centers of production. The Packing House Products Branch of the Subsistence Division and the Forage Branch of the Fuel & Forage Division were moved from Washington to Chicago, and the Cotton Goods Branch of the Clothing & Equipage Division established a procurement office in New York. Not included were Remount and Motor Transport, which had, or were establishing, their own zones of operation. A result of this decision was the fact that the Quartermaster Corps became a direct service for quartermaster supplies, and the relations of 1917, and before, between supply and military departments ended.

If planned months before, General Wood's decision and memorandum of May 13th could not have been more timely. The so-called "Overman Act" (an out-

growth of the Congressional investigations started in December 1917), approved seven days later by the President, authorized, among other organizational and procedural changes, effective until six months after termination of the emergency, what became known as the "interbureau procurement system," and was to make the Quartermaster Corps the most important War Department purchasing agency.

Though some time passed before all reorganization steps and changes undertaken between December 1917 and mid-May 1918 became fully effective, and others—chiefly rearrangements and reshuffling—were still in the offing, achievements were such that on May 9th a "Pershing cable" requested, for the first time, a cut in requisitions for clothing, and, at home, inductees, troops in training, and those embarking for overseas were being adequately equipped. The following months saw even greater achievements.

In July General Wood sent a liaison mission to France and England "for the purpose of gathering first-hand information relative to work of the Quartermaster Corps, with a view to obtaining more expert knowledge of the needs of our Army and establishing closer cooperation between the Quartermaster Corps abroad and in Washington." This mission, consisting of six officers, representing every division of the Office of The Quartermaster General, from Personnel and Finance & Accounts to recently created Hardware & Metals, made an intensive two-month study, ranging from the condition of supplies on board ship before unloading at docks, and dock facilities, to the condition of supplies when delivered to troops in the trenches, and, individually or collectively, reported their findings to, and obtained recommendations from, General Pershing; General Harbord, Chief of the S.O.S.; General Rogers, Chief Quartermaster, A.E.F.; General Dawes (then Colonel), Chief Purchasing Agent, A.E.F.; and those under them at their headquarters and in the field. Complaints were few, compliments were many, and every member of the mission, from its chief, who had been a long-time Regular Army Cavalry officer, down, was proud of his Quartermaster insignia.

In the meanwhile, at a meeting of Quartermaster personnel in Washington, on August 8th, Secretary War Baker, in referring to General Wood, said:

> How fortunate this great army is to have so good and able a provider. Indeed, when the history of this war comes to be written, there will be chapters which have, up to now, almost escaped notice. . . . Today, I had a letter from General Pershing in which he was commenting upon the perfection of supplies on the other side. . . .

France and England were not the only overseas destinations for Quartermaster supplies. Among others were Italy, Hawaii, the Philippines, Puerto Rico, China, Russia, and Siberia. In a talk General Wood made at this meeting he mentioned that:

> . . . to handle this task, there are now in the Quartermaster Corps over eight thousand officers, one hundred and fifty-five thousand enlisted men, and sixty-five thousand civilian employees, and that number is being increased all the time to keep pace with the wants of our constantly increasing Army.



James G. Harbord

One of the first major changes following initiation of the "zone system" and approval of the Overman Act was separation (though it did not last long) of Motor Transport from the Quartermaster Corps and establishment of the Motor Transport Corps, on August 15th, as an independent unit. Motor Transport had not only established its own zones of operation but had consolidated the purchase, maintenance, and repair of all motor-propelled Army vehicles except tanks, caterpillars, and artillery tractors, which were a function of Ordnance. Motor Transport also had technical supervision of all motor-driven vehicles of the various departments.

The most important, and last, organizational change was creation of the Purchase & Storage Division of the Purchase, Storage, & Traffic Division, which General Wood headed with the additional title of Director of Purchase & Storage, and of which Mr. Thorne became Assistant Director, while continuing as Assistant to the Acting Quartermaster General. This was under the provisions of the Overman Act, which, in addition to interbureau procurement, authorized the President to consolidate bureaus, agencies, and offices, and make such redistribution of functions as seemed necessary. Authorization was made through the Chief of Staff on August 25th, and General Wood and Mr. Thorne assumed their additional titles and responsibilities as of September 12th. With few exceptions—one of them the transfer, on September 18th, of Requirements, which had been reorganized as a Division some weeks before, to Purchase & Storage, charged with the determination of requirements and preparation of purchase authorizations under control of both the Acting Quartermaster General and the Director of Purchase & Storage—it was largely a case of planning and preparation of directives for November 1st, which had been set as the effective date.

The why's and wherefore's of this change, which was a forerunner of much that has been accomplished under present-day unification, were summarized as follows by Mr. Thorne in a talk at Baltimore, where, with General Wood, he was guest of honor at a dinner given by officers of the organization of the Depot Quartermaster:

> The supply system of the Army has been in the observation ward of the authorities at Washington for many months, and it has gradually come about that supplies have been placed in two general classes: first, those

> supplies which require a great deal of special designing, experimental work, and heavy factory production, such as aircraft, heavy Ordnance ammunition and explosives, and especially-designed construction projects for Engineers or the Construction Division; and, Class 2, all standard supplies whose design and specifications had been determined as satisfactory for military use. Under the new organization now being set up, the especially-designed class will remain with the present bureau which purchases these supplies, and all other supplies, embraced in Class 2, will be consolidated in the Division of Purchase, Storage, & Traffic, under General Goethals, Assistant Chief of Staff. Also, under the new organization, the storage and distribution of all supplies in Class 1 and Class 2 mentioned will be consolidated under General Goethals. The underlying reasons for these changes are to overcome the limitations of shipping, transportation, and storage facilities, and from the procurement side, the limitations of production, caused by shortage of labor and of raw material.

Though the Purchase & Storage Division of this new organization was built on, and around, the Quartermaster Corps as the Army's largest supply service, and Quartermaster personnel predominated, supply officers and enlisted men of other corps and departments, who continued to wear their distinctive insignia, were numerous. As a writer put it in 1919, there are two ways of looking at this organizational change: "one, that the Staff created an entirely new unit into which the Quartermaster Corps was absorbed; the other, that the Quartermaster Corps continued the logical line of its development and was enlarged. . . . Both viewpoints are true."

The effective date, November 1st, was only ten days before the Armistice, and the big job for months thereafter was largely one of requirements in reverse—cancellation of orders and disposal of surplus property. Between November 11, 1918, and June 30, 1919, more than 2,608,000 enlisted men and 128,000 officers were discharged from the Army.

General Wood and Mr. Thorne resigned as Acting Quartermaster General and Assistant to the Acting Quartermaster General, respectively, in February 1919. They were succeeded by Maj. Gen. H. L. Rogers, formerly Chief Quartermaster, A.E.F., as Quartermaster General and Director of Purchase & Storage, with Colonel C. P. Daly, who had been General Goethal's executive officer, while the latter was Acting Quartermaster General, as his Assistant.

It is unlikely that any three men ever worked together more harmoniously than General Goethals, General Wood, and Mr. Thorne, or that any three men more sincerely respected one another's opinions and the opinions of those who served under them. It was team-work at its best, and the writer has yet to learn of anyone privileged to serve under them who is not as proud as he himself is of having been a member of the "team."

For his World War I service General Goethals, who retired March 1, 1919—and whom General March called "a great engineer, a great soldier, and the greatest Chief

of Supply produced by any nation in the World War"—was awarded our Distinguished Service Medal; was named Commander of the Legion of Honor by France and Honorary Knight Commander, by Great Britain; and was awarded the British Order of St. Michael & St. George and the Grand Cordon of the Order of Wen Hu by China. Previously he had been awarded many medals by scientific and geographic societies and some fifteen honorary degrees by universities and colleges.

General Wood was awarded the Distinguished Service Medal; named Knight of the Legion of Honor by France; and Companion, Order of St. Michael & St. George, by Great Britain. Though head of the other of "the country's two largest mail-order and merchandising companies" (as he still is), General Wood undertook, at the request of General H. H. Arnold, two 'round-the-world missions for the Air Force during World War II, for which he was awarded the Legion of Merit.

"For especially meritorious service in reorganization of the service of supply," Mr. Thorne, one of the few civilians so honored, was awarded the Distinguished Service Medal. When asked some years later the secret of his success in working with officers of the Regular Army, he replied, "the polo field," which recalled a British saying of World War I that their battles had been won on the fields of Eton and Harrow.

There may be present-day readers of *The Quartermaster Review* who do not know that officers who served under General Goethals, General Wood, and Mr. Thorne gave life to the Society of Quartermaster Officers and were chiefly responsible for bringing into being its successor—the Quartermaster Association.

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Logistical Support of the AEF in the Field

Introduction. Army historian James A. Huston here describes the organization and execution of logistical support for the American Expeditionary Forces in the field in France during World War I. He discusses in detail the logistical activities associated with the Saint-Mihiel and Meuse-Argonne offensives and provides a statistical summary of the American logistical achievements in France.

Battlefield Logistics

Of all the problems of logistics, the most serious at the battlefield as in the rear was transportation. Shortages of vehicles, shortages of horses, and bad road conditions militated against Pershing's determination to return to open warfare. The obstacles, however, were not so great that they could not be overcome, at least at critical times and places; and if the AEF never had but half the motor vehicles considered necessary, nonetheless, it was the truck and the key role it played which, more than any other single thing, characterized battlefield logistics of World War I in contrast to previous wars. At one time ambulances would be called in to deliver rations, and at another trucks would have to evacuate casualties. The long hours that vehicles had to be kept in operation meant hard work for maintenance men as well as for drivers.

The shortage of horses made the shortage of motor trucks more serious. In fact, the motorization of additional units, particularly field artillery, was stepped up in order to help overcome the shortage of horses, but it was hard to find either horses or trucks.

Even when trucks and horses were available, they could not always operate, for under heavy traffic, especially in bad weather, roads soon gave way, and trucks and wagons frequently bogged down. Offensive operations were likely to move over battlefields completely impassable for vehicles, which meant that road details

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Reproduced from James A. Huston, *The Sinews of War: Army Logistics , 1775–1953* (Washington, D.C.: U.S. Army Center of Military History, 1966), pp. 378–87.



Motor transport in France

had to be ready at critical points to keep roads in repair and to build new ones as they were needed. Had the entire Army been set to building roads, an adequate network could not have been built as fast as needed across some of the no man's lands; however, engineer units did manage to keep enough roads open to get supplies forward most of the time. In November 1918 some 28,000 men were at work on the roads in the army areas, and five engineer battalions were operating quarries to provide crushed stone. Across country torn by shell holes, plank roads sometimes were laid because they were quicker, even though more expensive and less permanent than stone fill.

The narrow-gauge railroad offered the best alternative to the truck and the road. A system of 60-cm. lines developed during the period of stabilized warfare proved invaluable in serving the forward areas when offensive operations started. By laying connections across no man's land to the enemy's system, the advancing Allied troops could be kept up with easily. Track could be made up in sections of ties and rails in advance and laid very rapidly. It was estimated that it took a detail of 60 men ten hours to build a quarter-mile of plank road (four meters wide), whereas as much as three miles of light railroad track was laid by 135 men in five hours. During their spring offensives in 1918, the Germans laid 60-cm. track alongside practically every important highway, and actually used the light railways to carry most of their supplies. Of the 1,400 kilometers of light railroads the AEF was operating at the time of the armistice, over half had been taken from the Germans. Powered with over 100 steam and 60 gasoline locomotives, these lines

during October 1918 carried an average of 8,100 tons of supplies a day. Local units frequently put down light track (usually 40-cm.) to serve artillery positions, machine gun positions, and strongpoints. In these cases men or animals would move the small cars. All together the light railways did the work of several thousand motor trucks; more important, they could operate at times when the roads became impassable under heavy truck traffic and trucks could not be used at all.

Battlefield evacuation of the wounded, patterned after the system developed during the Civil War, had very different problems of application in the varying types of combat in France. Each division sanitary train had a field hospital section and an ambulance section which was authorized (but seldom issued in full) twelve mule-drawn ambulances and thirty-six motor ambulances. During the period of stabilized trench warfare, there were no serious problems: evacuation hospitals could be established in huts or buildings on a more or less permanent basis, and the relatively few casualties did not overtax facilities. In some cases the French handed over complete hospitals, with full equipment, to the American units relieving them. But when the great German offensives in the spring of 1918 pushed Allied positions back, and the Allied counteroffensive beginning in July kept moving in the opposite direction, it became a different story. There were not enough hospitals or hospital trains, or ambulances, and rough rides to the rear and long waiting all too often then were the lot of the wounded man.

Salvage of matériel from the battlefield, using wagons and trucks from the division ammunition train or from wherever they could be obtained, turned out to be a major supply effort. Special details were pressed into this work after a battle had subsided. They would collect equipment and send it to the rear on returning ration trucks. After the battle of 14–18 July 1918 on the Marne, a detail of 600 replacements collected nearly 300 truckloads of equipment to be turned over to the salvage squad at the railhead at Chailly Boissy.

Saint-Mihiel

With the counteroffensive in the Aisne-Marne sector successfully under way, in the summer of 1918 Pershing returned to his project for forming a separate American army. Foch ultimately agreed to his proposal to make a limited attack with an American army against the Saint-Mihiel salient—on condition that the Americans would be ready to launch another offensive in the Meuse-Argonne sector by 25 September. While there was a concentration of American divisions in the Aisne-Marne region, American units in August 1918 were scattered all along the front from the Swiss border to the Channel. To assemble them into a single army north of Toul posed one of the great logistical undertakings of the war. On 11 August American divisions began moving by rail, by truck, by the motor busses that earlier had been pressed into service from the streets of Paris and London, and on foot to the area of the newly formed American First Army. Three divisions came from the British front, four from the Vessel River front (Aisne-Marne sector), two from the Vosges in the extreme east, and three from training areas in the vicinity of Chaumont; four already were in the Saint-Mihiel region. On 12 September the

First Army, with nine American divisions and four French divisions in the line and three American divisions in army reserve, attacked both sides and point of the Saint-Mihiel salient.

Supply again could be based on the advance depot and regulating station at Issur-Tille, though it still was a considerable distance from the fighting front. Work on a forward regulating station at Liffol-le-Grand had been delayed during the weeks of uncertainty as to exactly where the American front would be. For army service units, air service and tank units, corps and army artillery, and divisions moving up in preparation for the Meuse-Argonne offensive; a regulating station was established at Saint-Dizier, and to serve it, the intermediate depot at Gièvres once more was designated an advance depot. When the threat of German attack was no longer a menace, supplies could be built up farther forward to support the advance.

Rains falling over the Saint-Mihiel battlefield added to the inevitable complication of supply. Mud on roads that would have been congested under the best of conditions held truck wheels firmly in grip, and lines of supplies backed up waiting for an engineer breakthrough. Engineers began laying railroad as soon as the attack began, and they widened a French one-meter line that had been laid in 1914, then left unused for four years. German light railways were taken over and roads built across the seas of mud. Since this was a limited objective attack, concluded within four days, the obstacles to supply did not become critical.

The Meuse-Argonne

Far more serious was the build-up and support of the Meuse-Argonne offensive. With his eyes open, Pershing accepted a commitment to launch within twenty-three days two great offensives in areas forty miles apart. Starting ten days before the Saint-Mihiel battle began, be had to concentrate 600,000 men, 2,700 guns, and 1,000,000 tons of supplies to launch a still greater operation thirteen days after the Saint-Mihiel attack. Logistical problems would have been a little simpler if the second American offensive could have been launched farther to the east, but the decision that it should be in the area forty miles west of Saint-Mihiel, between the Argonne Forest and the Meuse River, required a reorientation of supply lines. The Meuse-Argonne offensive was to be a part of a coordinated attack with the French Fourth Army on the left, aiming at Mézières and Sedan. Time and distance obviated the possibility of the divisions in the attack at Saint-Mihiel participating in the initial phase of the Meuse-Argonne.

Except for one division, actual movements of troops did not begin until the Saint-Mihiel attack was under way, and then every precaution had to be taken to preserve secrecy. Nine divisions were to be in the assault, but fifteen, including seven transferred from the Saint-Mihiel sector, were to be concentrated. A single division with its trains occupied nineteen miles of road space, and in this area where roads were few, where French divisions had to be relieved at the front and in reserve, where the French had to move up forces and supplies for their coordinated attack, and where movement had to be restricted to darkness, the logistical

complications were unequaled. Still, all forces were in position at the appointed time, though all were grateful for one-day's postponement in the time for the attack. With the greatest artillery barrage Americans had ever fired they jumped off at dawn on 26 September against positions the enemy had held with little variation for nearly four years.

A railroad from Sainte-Menehould to Verdun paralleled the front and was the main route of supply. Railheads for all the forward divisions were established along this line; others were established on the lines running to the rear. All together, there were nineteen railheads served principally through the regulating station at Saint-Dizier. Only two standard-gauge railroads ran forward in the direction of the advance, one of them in the French zone, the other under enemy fire. This meant that the First Army had to rely on the narrow-gauge railroads running in the direction of Montfaucon and in the Argonne Forest which could be tied into the German system as the advance continued, and on the three roads which ran as far as the front lines. Across no man's land, roads would have to be built and tracks laid if the advance was to continue.

The 40,000 tons of artillery ammunition in place when the battle began had to be replenished by 12 to 14 daily trainloads. Between 26 September and 11 November, American artillery fired 4,214,000 rounds of ammunition. Divisions had to be brought out of the line and new ones sent in; materials for roads and railroads had to be brought up without interfering with regular supplies. In contrast to the army general depot that had been established at Lieusaint during the Château-Thierry operations, in the Meuse-Argonne each service established several depots and kept them well forward—24 ammunition depots, 12 ordnance, 9 quartermaster, 9 gasoline and oil, 8 water points, 7 chemical warfare, plus depots for medical, motor, tank, and signal supplies, and 34 evacuation hospitals, were set up. In the area 3,500 motor trucks and 93,000 animals, as well as 215 miles of light railways, ultimately were in operation.

Following the advance closely, engineers built a standard-gauge line from Aubréville through the Argonne to connect to a line at Apremont which ran northeastward to Grand Pré and they repaired sections of the Verdun-Sedan line as quickly as they were cleared of enemy fire. When new railheads were opened as far north as Dun-sur-Meuse and Châtel-Chéhéry, those to the rear served the reserve divisions.

Delivering supplies to the units on the battlefield was, aside from the actual fighting, the most difficult aspect of the whole Meuse-Argonne operation. The thousands of trucks and animals in use were but a fraction of what was thought to be needed. Pershing stripped the SOS of its trucks and animals—thus crippling operations at the ports and at construction projects—and he called men out of the SOS to run depots, repair vehicles, and build roads in the army area. The fact that he could do this was one of his justifications for keeping the SOS under his command.

Even if all the vehicles and animals called for had been available, it is difficult to see how many more of them could have moved across the morass of the battle zone. The whole area of no man's land was covered with interlocking shell holes and piles of debris. Infantrymen of the 4th Division in their initial attack car-

ried boards from their trenches on which to cross the mud of the valley of Forges Creek. Pioneer units and engineers went to work building roads. They put in a plank road from Avocourt to Montfaucon. In many places they used sandbags and gravel—on one road alone they used 40,000 sandbags. It took three to five trains a day to bring in road-building materials, not to mention the six or seven trains a day for railway construction materials. The diarist of the 42d Division reported, "The condition of the roads is wretched. The orders are, 'guns up first, then ammunition for the guns, coffee and food later.'"[14]

Great activity went on in darkness. On every road behind the lines, a tangle of trucks and wagons would be trying to move forward with supplies. Ambulances carrying wounded to the rear had to wait for guns and ammunition to pass. Labor battalions were at work continuously trying to keep the roads passable, and ammunition companies were put to road building as well. Energetic officers fresh to the experience would hurry forward to break the traffic jam in front of them, disrupt even the semblance of a system, and assure the development of a half-dozen more tie-ups.

In the first phase of the offensive, many men went hungry. After consuming the two days of iron rations they carried, they were frequently without resupply. Rolling kitchens followed as closely as they could, but it was not possible very often to send hot meals forward to the fighting units. Details could go back to the ration dumps and pick up more iron rations, but then sometimes were unable to find their units when they returned. Hungry men in the advance searched dead comrades and enemy soldiers for rations.

As casualties mounted, the medical units were hard pressed to care for them. Sometimes it took six tired and weakened litter bearers to carry a man. Ambulances under heavy shellfire carried the wounded from aid stations to hospitals. Ten hospital trains a day evacuated wounded and sick men further to the rear.

On 10 October the American Second Army became operational, and on the 12th it took over a sector on the right of the First Army. On the same day the new regulating station at Liffol-le-Grand opened to serve it.

Facilities

In terms of the Army's previous experience, the facilities and activities of the SOS in France were immense. In terms of requirements, many thought they were not nearly enough. At each of no less than 130 cities, towns and villages in nearly all parts of France from one to a dozen major activities for the support of the AEF were in operation.

Sites were chosen, presumably, according to the best places from which to support operations at the front, but often compromises had to be made. Dijon, for instance, could not be used as extensively as desired because the movement of troops through there to and from Italy created too much congestion.

Buildings were leased or requisitioned through arrangements with the French, or they were constructed. Negotiations with French authorities for use of

the sites at first were long and tedious; however, the organization of periodic conferences later eased this situation. For construction projects it was necessary not only to get permission to use the land and to detail the terms of its lease, but also to have the whole construction plan approved, including arrangements for labor and materials.

Major construction completed before the armistice included over 15,000 barracks whose combined length would be 285 miles; hospitals for nearly 146,000 beds, equivalent to 146 miles of wards; covered storage space amounting to nearly 22,000,000 square feet, or 500 acres; 947 miles of standard-gauge railroads, all of it in yards except for a six-mile double-track cutoff around Nevers which included a bridge 2,190 feet long across the Loire River; the pier, warehousing and switching facilities to accommodate the docking of ten vessels at Bassens; a 750-foot pier, 84 lighters, and 7 derrick barges at Saint-Loubès; large municipal water supply developments at such places as Brest, Saint-Nazaire, and in the Bordeaux region; storage tanks along the seacoast for 150,000 barrels of gasoline and oil; remount space for 30,000 animals and veterinary hospital space for 23,000 animals. Most of the lumber for this construction had to come from France, whose foresters carefully marked the trees for cutting. By October 1918, 91 sawmills were in operation, and by December they had produced nearly 190,000,000 board-feet of lumber, over 3,000,000 railroad ties, and more than 1,170,000 poles and pit props, not to mention 375 miles of cord wood for fuel.[15]

Summary

On 31 October 1918 the AEF had a strength of 81,800 officers, with 1,037,000 men in the zone of the armies, and 855,600 men in the rear (including combat replacements as well as service troops), together with 47,700 civilian workers, and 35,000 prisoners of war being used as laborers. It had 20,000 saddle horses, 94,000 draft animals, and 2,500 pack animals in the zone of the armies, and 25,000 saddle horses, 21,500 draft animals, and 87 pack animals in the rear. It had on hand 70,000,000 rations, including 15,500,000 in the zone of the armies, for the men, and 4,500,000 rations of forage for the animals. It had a total of nearly 30,000 trucks, 7,800 motor cars, and 13,700 motorcycles. The AEF was operating, partially, 6,000 miles of standard-gauge and 1,400 miles of narrow-gauge railroads; it had in operation 1,380 locomotives and 14,000 cars for standard-gauge, and 450 locomotives and 3,300 cars for narrow-gauge railroads. Its weapons included 1,400 pieces of heavy artillery, 1,890 pieces of field artillery, 1,362,000 rifles, 68,000 machine guns and automatic rifles, 1,000 trench mortars, and 240 tanks, and it had 868 airplanes and 79 balloons in the zone of the armies and 1,092 airplanes and 140 balloons in the depots and rear areas. Its ammunition supply included, in the zone of the armies, 122,400 rounds for heavy artillery, 2,500,000 rounds for field artillery, and 166,000,000 rounds for rifles and machine guns; in the rear areas, 310,800 rounds for heavy artillery, 6,470,000 rounds for field artillery, and 716,000,000 rounds of small arms ammunition. Hospitals at that time included 153 in the zone of the armies, with beds for 48,520 patients of which

30,241 were occupied; hospitals in the rear areas had a capacity of 224,330 beds of which 133,526 were occupied.[16]

Was all of this enough? Surely for some military leaders there is no such thing as enough. With millions of tons of supplies descending upon them, threatening to smother them, the cry always is for more. In World War I commanders feared that the armies, just freed from the immobility of trench warfare, were threatened by the weight of their supplies and, conditioned to a vast administrative structure and highly organized railway facilities, had become subject to further immobilization as soon as they ventured away from their previously developed communications.

In spite of the real or imagined shortages of most items, the logistical efforts of the AEF and of the Allies did prove to be sufficient to accomplish the task at hand. If men at the front sometimes went hungry, if ammunition sometimes ran low, if evacuation of the wounded sometimes was less than satisfactory, it more than likely was not the result of any general shortage of supplies in the area or even of transportation, but the result of enemy action and the inherent difficulties of getting supplies forward and casualties rearward during intensive combat. On a visit to the 1st, 2d, 3d, 4th, and 28th Divisions a week after the launching of the Aisne-Marne counteroffensive, General Hagood found all the division commanders satisfied with the logistical support they were receiving from the SOS.

Nevertheless, the success of battle seems to have concealed some serious deficiencies. Yes, supplies and facilities proved to be sufficient for the task at hand; but what if the war had continued several months more? Then this is not so sure. A few more weeks or months of combat as extensive as that in the Meuse-Argonne—and plans were afoot for the Second Army to launch another offensive in mid-November—might have threatened the entire system. It is unlikely that available transportation was enough to continue for long the delivery of supplies to the front at the rate they were being consumed, and even had that been possible, reserves might have been near depletion before new shortages of ocean shipping could have been overcome. Many more weeks of casualties at the rate they were suffered in the Meuse-Argonne (in six weeks the United States had 120,000 killed and wounded, or nearly 50 percent of its battle casualties for the whole war) would have overwhelmed the U.S. evacuation and hospitalization system, which in turn would have further complicated the movement of men and supplies.

Even the organization for logistics had not been completely settled at the time of the armistice. Pershing had been able to hold to his position that the Services of Supply should be under his command and not under a co-ordinate commander under the War Department though logic was not necessarily altogether on his side on this point. Relations between GHQ and SOS continued to be vague. There was a certain rivalry between the commanding general at Tours and the G–4 at Chaumont, and control of activities in the Advance Section was always divided. It would have helped if an army rear boundary had been drawn to mark off the army area from the Advance Section. It might have helped more if the suggestion had been taken to move G–4 and G–1 completely to Tours. As it was, a certain "layering" of headquarters existed, particularly during the period before field armies were organized.

In the general picture transportation remained the key. At first the critical item was ocean stepping. Then it was the unloading of ships. Then it was inland transportation—mostly a lack of equipment, but, again, the organization for co-ordination and control was unsatisfactory much of the time. Contributing to the difficulty was the lack of service personnel that resulted largely from the emergency shipment overseas of infantry troops during the spring of 1918 to help meet the threat of the great German offensives.

In a way, all aspects of logistics in the AEF were interrelated. Many of the shortcomings could be attributed to lack of experience and to a corresponding lack of advance planning, and to a certain multiplier factor which caused a deficiency in one area or activity to run through many other areas and activities, magnifying existing deficiencies or creating new ones. But experience of the kind required was experience that neither the AEF nor any other army had, for the support of such a force at such a distance from its homeland and from its base ports was a pioneer effort in 1917 and 1918.

Notes

[14] Sherwood, *The Diary of a Rainbow Veteran*, p. 175.

[15] Final Report, ACofS, G–4, GHQ, AEF *U.S. Army in the World War*, XIV, 70–71, 147–48, 223–25; *U.S. Army in the World War*, XV (Washington, 1948), 75–79; Report of the Military Board of Allied Supply, 2 vols. (Washington, 1924, 1925) II, 868–82, 910–21; Jacques Aldebert De Pineton, Comte de Chambrun, *The American Army in the European Conflict* (New York: The Macmillan Company, 1919), pp. 92–115, 342–50; Hagood, *The Services of Supply*, pp. 160–62, 340–42; Isaac Marcosson, *S.O.S., America's Miracle in France* (New York: John Lane Co., 1918), pp. 220–36, 289–92; William J. Wilgus, *Transporting the A.E.F. in Western Europe* (New York: Columbia University Press, 1931), pp. 290–302.

[16] Report of Military Board of Allied Supply, I, 48–62.

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Accomplishments of the Quartermaster Corps, AEF

Introduction. This excerpt from the final report of the Military Board of Allied Supply presents a statistical summary of the activities of the Quartermaster Corps of the American Expeditionary Forces in France during World War I. The raw numbers alone give some idea of the magnitude and diversity of logistical operations in the American Army in France in 1917–1918.

Quartermaster Corps, AEF[1]

The chief duties of the Quartermaster Corps (Q.M.C.), in the A.E.F., were to feed, clothe and pay the Army, although it was charged with many others, including the supply of fuel and forage, salvage, grave registration and, at one time, dock operation and motor transportation. It had to perform these varied functions for an army of 2,000,000 men and at the same time prepare for an army twice that size.[2]

Maximum strength (on December 15, 1918):	
Officers	4,229
Men	96,451
Field clerks	42
Strength at Armistice:	
Officers	4,027
Men	96,006
Field clerks	38
Forage received, tons	824,410
Animals received, all sources	243,560
Remount depots	35
Mechanical bakeries	4

Reproduced from *The Allied Armies Under Marshal Foch in the Franco-Belgian Theater of Operations, Report of the Military Board of Allied Supply*, 3 vols. (Washington, D.C.: Government Printing Office, 1924–1925) 1: 339–40.

Field bakeries			61
Coffee roasting plants			3
Ice making plants			7
Cold storage plants			21
Main gasoline storage depots			6
Gasoline storage and distributing stations			28
Motor gasoline consumed	gallons		87, 663, 056
Aviation gasoline consumed	do		5,627,572
Coal receipts to May 1,1919	tons		1,953,777
Salvage depots			4
Salvage shops			17
Degreasing and rendering plants			4
Clothing received:			
From United States	tons	107,429	
From Europe	do	12,032	
			119,461
Food:			
From United States	tons	1,313,525	
From Europe	do	248,150	
Total (in the following commodities)			1,561,675
Meat	tons	421,322	
Sugar	do	74,455	
Tobacco	do	24,986	
Butter	do	21,907	
Flour	do	412,050	
Beans	do	58,767	
Milk	do	39,756	
Pepper	do	871	
Fruits	tons	88,300	
Vinegar	do	15,961	
Rice	do	29,974	
Coffee	do	40,972	
Cinnamon	do	424	
Salt	do	21,249	
Potatoes	do	309,478	
Tea	do	203	

Reserve of above on hand Nov. 11th, 1918: 93.75 days.

Food consumption (pounds per man per day):	
Potatoes	1.1770
Meat	1.0729

Food consumption (pounds per man per day)—Continued.

Flour	0.8527
Sugar	.2409
Fruit	.2302
Beans	.1793
Milk	.0976
Coffee	.0794
Rice and hominy	.0734
Butter	.0686
Tobacco	.0576
Salt	.0477
Vinegar	.0332
Candy	.0228
Baking powder	.0051
Pepper	.0019
Flavoring	.0013
Cinnamon	.0009
Total	4.2887

[1] Prepared by Col. J. W. Wright, Historical Branch, War Plans Division, with the assistance of Major J. W. Melvin and approved by General H. L. Rogers, Quartermaster General, A. E. F.

[2] Chart 7, Chapter XI, Vol. I.

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The Military Board of Allied Supply

Introduction. In a very brief study Maj. John S. Jadwin of the Army War College Historical Section summarizes the purpose, organization, activities, and record of the Military Board of Allied Supply created to coordinate Allied logistical operations in World War I.

The Military Board of Allied Supply was created May 14, 1918, by an agreement between the French and Americans, providing:—[1]

"(1) That the principle of unification of military supplies and utilities for the use of the allied armies is adopted.

"(2) That in order to apply this principle and as far as possible coordinate the use of utilities and the distribution of supplies among the allied armies, a board consisting of representatives of each of the allied armies is to be constituted at once.

"(3) That the unanimous decision of the board regarding the allotment of material and supplies shall have the force of orders and be carried out by the respective supply agencies.

"(4) That further details of the organization by which the above plan is to be carried out shall be left to the Board, subject to such approval by the respective governments as may at any time seem advisable.

"We agree to the above and wish it to be submitted to the British and Italian Governments."

At a later date the English, Belgian and Italian Armies ratified this constitution. The scope of the Board covered the Services of Supply of these Armies but not the French Zone of the Interior, which was under French civil authority.

Official recognition of American participation was made on June 20, 1918,[2] and Col. Charles Dawes was designated as American representative on the Board.

The Board held its first meeting on June 29,[3] and its last on Dec. 3,[4] 1918. Its principal activities were:—[5]

Reproduced with permission of the U.S. Army War College, from John S. Jadwin, "Military Board of Allied Supply," Army War College Historical Section Study no. 21, typescript (Washington, D.C.: United States Army War College, August 1942).

"(1) To enable the empty warehouse capacity of all the Allies to be used in common, should it be found necessary, there was prepared by this board a map showing the complete installations in rear of the three armies with details as to capacity.

"(2) When the shortage in motor transport in the allied armies became acute, necessitating interallied use of the motor transport of any army, the Board studied the question of a mobile motor-transportation reserve for the use of the marshal, commander in chief. The original plan was to create a potential motor reserve of 24,000 trucks. At the date of the Armistice this potential reserve consisted of an equivalent of 11,000 3-ton automobile trucks.

"(3) To enable such motor transport reserve to function, a special study of the question of the circulation of traffic in rear of the allied armies was considered. Interallied regulations governing road traffic in the zone of operations, governing troop movements, and the hauling of material by mechanical transport, were prepared. These regulations were approved by the general in command of each allied army and by Marshal Foch.

"(4) The Board established a school at Rozoy (Seine-et-Marne) for the instruction of motor transport and staff officers in connection with the interallied regulations governing motor transport in the rear of the allied armies.

"(5) To form a link between the railhead and the motor transport and to release the motor transport for other uses, there was organized an interallied reserve of narrow-gauge railway (60 cm.) matériel. For the training of officers in the use of this reserve, a school was established at Nangis (Seine-et-Marne).

"(6) Through the efforts of the Board the ammunition at the front was pooled by the French and American armies.

"(7) The Board established a school for railroad regulating officers of the allied armies at St. Dizier.

"(8) It provided regulations for the distribution of gasoline in the zone of the armies and the pooling of gasoline cans.

"(9) When the shortage in forage became acute, particularly in the supply of hay, a composite study was made of the forage situation in all the allied armies, as a result of which a uniform forage ration for these armies was adopted

"(10) To enable communication to be maintained by the headquarters of the marshal, commander in chief, and the various general headquarters during the contemplated advances, there was provided by the Board an allied agreement for interallied construction and maintenance of second-line telephone and telegraph system. With the signing of the Armistice this agreement provided the channel by which telephonic and telegraphic communication was secured in the occupied territories.

"(11) The Board investigated the labor situation in France and the allied armies, and demonstrated the impracticability of pooling the same.

"(12) Had the war continued it was foreseen that a transport crisis would develop. The Board therefore prepared a study setting forth the ration and other demands of the various armies which would have enabled a reduction in tonnage to the absolute minimum to be made.

"(13) Advantage was taken of the existence of this Board at the date of the Armistice to secure from each of the allied armies a statistical statement of all troops, supplies, and means of transport existent as of date of October 31, 1918.

"(14) The last work of this interallied Board was the securing of a coordinate statement and comparative study of the supply systems of the allied armies in France for future military study in the various armies."

As a general principle, the Military Board of Allied Supply handled policies of supply whenever there was an existing or prospective shortage of any type of supply in any the allied armies.

It is pertinent to state that distrust and suspicion had to be overcome before the Allied Powers could accept the principle of cooperation.[6] This was partially but not wholly removed by creation of the Board.

For example the French might have been charged with bad faith when, on August 22, their representative declared they had no excess storage space which could be made available to the A.E.F., thereby ending consideration of this important matter by the Board.[7] However, under the French organization, the warehouses in question must have been installations of the French Zone of the Interior which were specifically exempted from the scope of the M.B.A.S. and it further appears that on August 28th a Decree[8] was published which plainly contemplated making changes in civil as well as military organizations to insure more effective cooperation with the Allied Armies.

Had the war lasted longer it is evident that the M.B.A.S. would have had a record of positive accomplishment. Its approach, through study and mutual understanding, yielded sufficient results to prove the worth of its methods.

Notes

[1] Org. Services of Supply, Doc. 1009, A.G., 1921, p 32. (A Monograph published by the Historical Section, A.W.C.)
[2] G.O. #100. G.H.Q., A.E.F., 1918.
[3] Dawes, *Journal of the Great War*, Vol. I, p 131.
[4] Dawes, *Journal of the Great War*, Vol. I, p 222.
[5] Org. Services of Supply, Doc. 10009, A.G.[,] 1921, pp. 34–5.
[6] Dawes[,] *Journal of the Great War*, Vol. I, p 99.
[7] Report of C of S, American Section, Feb. 21, 1919, Folder #326.
[8] Report Military Board Allied Supply, Vol. II, p 98–99.

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Cooperative Logistics in World War I

Introduction. Col. E. S. Walton, Quartermaster of the U.S. II Corps in World War I, describes the logistical support provided by the British to the U.S. II Corps which served with the British Expeditionary Forces in France from 1917–1918. He points to some of the difficulties encountered in having the forces of one country rely on the logistical system of another country and concludes that, overall, this experiment in cooperative logistics was a success.

During the month of February, 1918, it was decided by our General Headquarters in France to organize the Second Corps and place it in the British Area, there to receive final training and try-out. To this end several conferences were held between officers of the British staff and our own at which were taken up and settled some of the main points concerning this arrangement.

British Agreement

The substance of the agreement was that the British would supply our troops in the same manner and on the same scale as they did their own, including shelter, medical service, transportation, etc., the cost of such support and supply to be repaid by the United States at a figure to be agreed upon later.

In conformity with this arrangement the formation of a Corps Staff was commenced at once and the Chief of Staff, the Ordnance Officer, the G–4, and the Quartermaster, left Chaumont early in March for their new station where the preliminary arrangements were made to receive and care for the divisions as they should arrive.

Only Riflemen There

We were to have only the riflemen of the divisions with us, the artillery going to points in central France for their training, our maximum strength amounting to ten divisions, the average being about four.

Reproduced with the permission of the American Logistics Association, from E. S. Walton, "Looked After by John Bull," *The Quartermaster Review* 1, no. 2 (September–October 1921): 22–26. N.B.: *The Quartermaster Review* is a discontinued publication of the American Logistics Association.

My first duty was to study the British system and my second was to see how it would fit American troops with the least modification. The British Quartermaster General in France was a Lieutenant-General and had under him a number of Major Generals as chiefs of the sub-divisions of his office. The ones we were most interested in and to whom we looked for assistance and advice were the Chief of Ordnance, the Chief of Supply and the Director General of Transportation.

The British Ordnance Department includes what we know as Ordnance and in addition handles clothing, equipage, some signal supplies, and some medical supplies. The Supply Division carries and issues rations, forage, fuel, gasoline and lubricants. The "D.G.T.", as our cousins call him, handles all transportation and has charge of maintaining ordinary roads.

"Unlearning" Much

With this set-up to deal with, differing as it did from our own system, our Quartermasters and Supply Officers had immediately to "unlearn" much of the knowledge for the accumulation of which they had burned the midnight oil at home. A circular letter of instructions was prepared setting forth in the fewest possible words the principal differences which they would have to note and observe if they wanted to keep their troops supplied. This was handed to each Division Quartermaster as soon as he landed and to as many of his subordinates as could be reached.

An important part of this circular was a glossary of terms used by the British, for it was important that an officer should not ask for a truck unless he wanted a freight car, and that when he was told that his rations would arrive on the next "pack train" he should not waste any time in looking for a string of laden mules but would betake himself to the railhead and wait for the daily train of automatic supply.

This letter also contained a list of the principal office titles arranged by the initials, inasmuch as the British seldom used full titles, even in official communications, and it was very important that our officers should have at least some idea of who was being talked about when a Britisher commenced rattling off a long string of initials that sounded like a scrambled alphabet.

A Ban on Rum

General Pershing had made two stipulations when arriving at the original arrangements for our troops to serve with the British; these were that they should wear the American (outer) uniform and that the rum ration should be cut out and coffee substituted for tea. The uniform requirement caused me a great deal of worry and concern and the coffee requirement made an equal amount of trouble for the British supply officers, so I presume the matter was a standoff.

Coffee was not an article of the British ration and it was scarce in France, but I do not think there was a case where the British failed to produce the coffee on the fourth day after troops reached their billets, this time being required for supplies to reach the troops after word of their needs was sent to the base depots.

One of the most serious questions of supply was that concerning the rifles. It was expected that at various times during the period of training our troops would go into the line first by platoons, then by companies, and later in larger units, until they were in condition to take over sectors of their own.

British Rifles for Americans

This meant that they must use the same rifle as the British soldier and to accomplish this result it was necessary to take the American rifles from our men at the base ports and issue them British rifles. Another troublesome problem was that of cutting down the amount of baggage carried by both officers and men; this was also attended to at the base port before the troops left for their billets.

The training areas were of course assigned before the troops arrived in France, information of arrivals in England being wired Corps Headquarters. The actual time of arrival in France was seldom known very far in advance, as the Channel ferries were often held up on the other side on account of bad weather or because of rumored submarines.

Perhaps the simplest way to explain the system into which we had to fit ourselves would be to follow a day's arrivals at Calais. We will suppose two regiments arriving at about noon; the British M. L. O. (Military Landing Officer) would receive word when the ships left the English port, and about how many troops were on them—we seldom got regimental designations in this message and frequently made bad guesses as to whom we were going to meet.

Passing On The Word

I had an American Port Officer at each place where our troops landed and this information was passed to him at once and by him telegraphed to our headquarters and to the Area Commandant where the troops were supposed to go. At the same time the Commandant of the rest camp, or casual camp, was notified of the probable time of arrival and the number of men.

When the ferries arrived the troops were disembarked as rapidly as possible and, after making a detail to unload baggage, were marched off to camp, each column or subdivision being led by a British soldier as guide. Tents were allotted at once, under supervision of the camp authorities, and the men formed for mess—there was generally at least one meal due them and they were always ready for it.

These messes were run by the "Expeditionary Force Canteens" and meals consumed were paid for by the British Supply Officer upon tickets which were issued to the men and by them turned in as they entered the mess hall. The mess was excellent, as was also the officers' mess in each camp which was run by the same organization.

Stripping Down Their Baggage

By this time instructions had been imparted to the various commanding officers and immediately after mess one portion of the command would start in strip-

ping themselves down to just what they could carry on their backs—officers being allowed fifty pounds of baggage in addition to whatever amount they were willing actually to carry.

Each man was told to retain his best uniform, two suits of underwear, two pairs of shoes, three pairs of socks, two shirts, and the usual toilet articles and odds and ends. At first the overcoats were taken away from them but it was soon found that this was a mistake and they were allowed to keep them, the first troops having their overcoats forwarded to them by rail.

This process of weeding out was a heart-breaking affair. Many a man could be seen hesitating between his second pair of shoes and his best girl's nicely framed picture. It was really pitiful to see the amount of stuff which officers had to discard after having been told to bring it all along as indispensable. All government property was placed in a pile and private property, trinkets, etc., were replaced in the barrack bag or trunk locker and plainly marked with the owner's name and outfit, to be stored in Calais until called for.

While one portion of the command was going through this process the other half were turning in the American rifles and drawing the British weapon. All our rifles and belts were, of course, built for the same ammunition, but there were slight variations in the models which made each outfit a study in itself.

Shuffle of Belt and Scabbards

Troops armed with the Springfield had to be issued entire new outfits including the belt—on account of the scabbard hanger; some of those armed with the Lee could retain their belts and some could hold on to the belt and scabbard. On the second half-day these processes were reversed so that before the end of twenty-four hours these troops were ready to entrain and clear the camp for the arrivals of that day.

As soon as it was definitely known just what organizations were in the day's arrivals a strength list was sent to the Supply Division and the proper additions were made to the automatic supply destined to leave the following day for the railhead which was to serve these new troops. This continued automatically until the railhead officer took these men up on his first report. The railhead always had a reserve sufficient to take care of the additions until their supplies began to come through.

The British "Indent"

The British Army uses an "Indent" where we use a "Ration Return" or "Requisition." With them this latter term means only a requisition on the inhabitants and is never used as we use it. As soon as our troops arrived in their area the Supply Officer commenced to put in his daily indents; these went to the Division Quartermaster if the division was together, or to the senior American Quartermaster if it were not, and was by him consolidated on one form for transmission to and through the "S. S. O." (Senior Supply Officer) or "D. A. D. O. S." (Deputy Assistant Director of Ordnance Supplies) as the case might be.

In order to facilitate future accounting I had reprinted the British indent on green paper and these were used by our troops for everything which they obtained

directly from the British. On this account our needs were not consolidated with those of British units served by the same railhead but were kept separate as far as the paper work was concerned.

After the arrival of the supplies the procedure was very much like our own, with the exception that wherever such a thing was possible, it was simpler. Certain equipment was furnished without request, such as wagons, animals, lorries, automobiles, etc.

It was the original intention to furnish our troops with transportation on the same, or a slightly larger, scale as corresponding units in the British Army, but the great losses in transportation caused by the German drives of March and April had reduced the available stock to such a point that we, inasmuch as we were only in training, had to get along with much less than many old soldiers thought possible.

Salvaging Our Cast-offs

In the meantime a force of American officers and men, supplemented by the labor of scores of French and Belgian women, were salvaging the uniforms, equipment, and personal property discarded by our men. Uniforms were washed and repaired, sized, and put up in bundles to be available for issue when necessary. I was told very plainly that I could not expect any additional stock from our depots in France so there were very few pieces thrown away by the salvage party.

The issue later of this repaired clothing caused a good deal of growling on the part of both officers and men, but it could not be helped and if they had only known it they were lucky to get any American uniforms at all. I bought 200,000 pairs of spiral puttees from the British, but with this exception I was able to meet all calls until late in the summer when new clothing was made available.

Purely American issues were made upon American requisition forms, to avoid confusion, and when the clothing or other articles were ready for shipment the marked bundles were placed in the British "supply stream" and very promptly found their way into the hands of the consignees.

The British Ration

The main part of the British ration consisted of:

1 lb. fresh or frozen meat,
1 lb. bread (or 12 ozs. biscuits),
8 ozs. fresh vegetables (or 2 ozs. dried),
4 ozs. bacon,
Cheese, tea, sugar, salt, etc.

As a substitute for the separate meat and vegetable components there was provided a "Meat and vegetable ration" consisting of a sort of rich stew. Our men demanded a bulky ration and the greatest kicks were connected with the scarcity of fresh vegetables, but we finally persuaded the Supply Department to increase the allowance to three-quarters of a pound.

This was satisfactory as long as vegetables were on hand for issue, but it frequently happened that the supply was short. Then the increased ration did not do us much good, and I will venture to say that as a result our men became even better acquainted with turnips and carrots than did the other American soldiers.

Supplied from Tommy's Stock

Underclothing, blankets, socks and shoes, were supplied from British stock when replacement was required. Our units were assigned to certain baths for service and took their turn with British units; in these baths the men turned in their soiled underclothing when going in and drew a clean outfit as they came out.

Little effort was made to issue proper sizes, and among the British troops this did not seem to cause much trouble because the average assortment of clothing corresponded fairly closely with the average of the lot of men who were making the drawing. They were able to swap around with considerable satisfaction.

But when our larger men came to draw the clean clothes they generally fell far short on the large sizes, the British Army being reduced at this time to a much shorter average than our Army or than their own probably was in the early days. The underclothing difficulties did not matter so much, but when it came to swapping flannel shirts in this manner the problem was really serious.

No Swapping of Shirts

The British shirt was gray, and to have followed the same system would have meant that we would be constantly feeding olive drab shirts into their clothing pile, with very little chance of ever recovering them, while we would be rapidly outfitting our troops with a gray shirt which had no collar and which was entirely unacceptable to our commanders.

As a result we had to draw the line on shirts and [most] of them were washed by the men themselves unless they could coax some French dame or damsel to take pity on them.

One item of supply which we demanded was a source of never-ending amazement to the British supply officers, and that was stationery. They use very little paper themselves in their military service and they could not understand what on earth we did with all the paper, ink, pencils, etc., which we drew from them.

I was in the office of the Commanding Officer of the Calais Ordnance Depot one day when an officer came in with a real problem; it seemed that one of our divisions had "indented" for three gross of "gum bands," and the depot did not have that many on hand.

"Blighters" and Stationery

The Depot Commander remarked to me that that one list, supposedly for a month's supply for one division, carried more writing paper than his Depot would use in six months, and added: "I don't see when you blighters find time to fight."

In spite of the fact that very few reports were rendered and the paper work of the combat units was reduced to an infinitesimal quantity, their records back of the lines were really wonderful. These were kept mostly by girls, "Waacs," supervised by wounded or disabled Sergeants or Sergeants Major.

It was not known at first whether we would repay the British for just what we got or whether repayment would be placed on a capitation basis. The latter plan was finally adopted and in working out a fair price I discovered that their accounting officers knew to a fraction of a farthing what was the average cost per man of such intricate items as the various kinds of shelter; trench shelter, huts, ments, and billets; the transportation going on or coming off of leave; medical services; ammunition, all kinds being distributed evenly over the command; laundry service; etc.

By making a few changes necessitated by the different ration and some other variations between the two armies it was possible to arrive at a capitation rate on the basis of which our government was to pay the British government for our upkeep while with them. The final result appeared perfectly satisfactory to the other side but to me it looked like a real bargain; the last few steps in the formation of this rate were taken after I left the Corps but my recollection is that it came to about 6 shillings six-pence per man (and officer) per day.

Patient John Bull

We found the Britishers most cordial and helpful, especially those in the supply end of the game. These comrades displayed great patience with our officers and men, and made generous allowance for the fact that our people were not experienced in their work and that what they had learned at home was now of little use to them. We had our troubles, of course, but none of them was caused by lack of cooperation on the part of our instructors.

I believe that few of our Quartermasters or Supply Officers who stayed in that area any length of time came away from there with anything but the kindliest feelings for their newly found cousins and admiration for the wonderfully smooth-working supply machine.

Chapter 8

Logistics of the Second World War

50

Industrial Mobilization Planning Between the Wars

Introduction. Army historians Marvin A. Kreidberg and Merton G. Henry describe the three key agencies charged with responsibility for industrial mobilization planning during the interwar period: the Planning Branch of the Office of the Assistant Secretary of War, the Army Industrial College, and the Army and Navy Munitions Board. They stress the efforts undertaken to overcome the confusion and inefficiencies encountered in World War I and note that in an era of "total war" effective logistical support of armies in the field begins with effective planning at the highest levels for their organization and supply.

Industrial Mobilization Planning—A War Department Responsibility[1]

Until World War I it had been a tradition in the United States that at the end of a war the Nation would return as rapidly as possible to a civilian peacetime status and that the military machine which had been built up during the war would be instantaneously stripped of all its essential parts. This tradition was broken, in some respects, by the passage of the National Defense Act of 1920.

The ineffectiveness of military procurement and industrial mobilization during World War I resulted in the inclusion by Congress in the National Defense Act of 1920 of a provision which it was hoped would remedy this situation in future emergencies:

> Hereafter, in addition to such other duties as may be assigned him by the Secretary of War, the Assistant Secretary of War, under the supervision of the Secretary of War, shall be charged with the supervision of the procurement of all military supplies and other business of the War Department pertaining thereto and the assurance of adequate provision

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Reproduced from Marvin A. Kreidberg and Merton G. Henry, *History of Military Mobilization in the United States Army, 1775–1945*, Department of the Army Pamphlet 20–212 (Washington, D.C.: Department of the Army, June 1955), pp. 493–502.

> for mobilization of materiel and industrial organizations essential to wartime needs. . . . There shall be detailed to the Office of the Assistant Secretary of War from the branches engaged in procurement such numbers of officers and civilian employees as may be authorized by regulations approved by the Secretary of War. . . .
>
> Under the direction of the Secretary of War, Chiefs of Branches of the Army charged with the procurement of supplies for the Army shall report direct to the Assistant Secretary of War regarding all matters of procurement.[2]

By this act the Assistant Secretary was charged not only with current Army procurement and plans for future Army procurement, but also with the task of preparing plans for the mobilization of American industry to be used whenever another major war occurred. It had become an established fact during World War I that major wars henceforth were "total wars" comprehending the whole of the warring nations' economy and manpower. Within this concept, the mobilization planning task assigned to the Assistant Secretary required integrating into one smoothly functioning machine the huge industrial capacity of the United States together with its economic resources and wealth.

The confusion concerning overlapping and divided mobilization responsibilities assigned to the Assistant Secretary and to the General Staff were resolved by the Harbord Board and by War Department General Orders No. 41, 16 August 1921, on the common sense decision that the General Staff's responsibility was to determine what was needed, how much, and when; the Assistant Secretary's responsibility was to procure materiel to meet these requirements in the quantities and at the times stipulated, and, more difficult, to plan for economic mobilization.[3] Over such matters as supervision of research and development, standardization of specifications, and storage control both the General Staff and the Assistant Secretary could assume responsibility, with inevitable friction developing. The General Staff assumed responsibility for all three of these functions, but an Army Regulation[4] recognized the Assistant Secretary's vested interests in at least one of them by directing the technical services to cooperate with the Assistant Secretary on standardization, but through the General Staff. The situation was not definitively clarified until the publication of AR 5–5, 16 July 1932, which assigned responsibility for the issues in doubt to the Assistant Secretary.

One other issue between the General Staff and the Office of the Assistant Secretary that caused difficulties was the allotment of budgetary funds which was under the supervision of the General Staff. Inevitably, fixed current expenses of the Army were given preference to planning funds since there would be understandable difficulties in cutting down on such fixed items as pay, food, and clothing for the forces in being. The funds allotted to the Office of the Assistant Secretary for future planning were, therefore, rather limited and were not, as a matter of strict fact, even allotted specifically for that purpose; they were so entangled in other fund allotments that it was difficult for the General Staff to determine exactly how much it was authorizing to the Assistant Secretary for procurement

planning.[5] It was not until 1939 that [the] Assistant Secretary of War was assigned responsibility for supervising the budgetary estimates for procurement planning in the War Department.[6]

Thus the three basic industrial mobilization planning agencies established in the 1920's and developed in the 1930's were:

1. The Planning Branch, Office of the Assistant Secretary of War.
2. The Army Industrial College.
3. The Army and Navy Munitions Board.

The Planning Branch

Under the National Defense Act of 1920 the technical or supply services of the Army—Quartermaster, Engineers, Signal Corps, Ordnance, Chemical Corps, Medical Department, and Air Corps—had a dual responsibility. They had to prepare, under General Staff supervision, the data for requirements; but once these statistics had been collated and approved by the General Staff, the services were responsible to the Assistant Secretary for preparing the data on how and where to procure the material which they had already determined to be the requirements. In 1921 the Assistant Secretary decided to set up his own organization and to deal directly with the technical-supply services rather than through G–4.

Col. H. B. Ferguson, a student at the Army War College, was withdrawn from his class and given the mission of organizing procurement planning for the Assistant Secretary.[7] Colonel Ferguson began by requesting recommendations from the chiefs of the technical services. After studying these recommendations, the first organization step was taken on 25 October 1921 by the publication of Memorandum Orders No. 1, Office of the Assistant Secretary of War:

> There is hereby established as part of the Office of the Assistant Secretary of War a Procurement Division. This Division is specifically charged with the supervision of procurement of all military supplies and other business of the War Department pertaining thereto, and the assurance of adequate provision for the mobilization of material and industrial organizations essential to war-time needs. . . .
>
> There are hereby established the following branches of the Procurement Division:
>
> (a) Planning Branch.
>
> (b) Current Supply Branch.[8]

The Planning Branch was assigned not only the major missions of planning for wartime procurement and for industrial mobilization, but was also made the agent of the Assistant Secretary for dealing with the Navy and other governmental departments on all matters pertaining to the allotment of industrial facilities and materials required for war. Colonel Ferguson was made head of the Procurement Division; and Col. C. M. Saltzman of the Planning Branch. Seven more officers were selected by the various technical services for assignment in the Planning Branch.[9]

For some years the Planning Branch was the only agency engaged in industrial mobilization planning. Later when the Army Industrial College was established to assist in the work, and still later in the 1930's when the revitalized Army and Navy Munitions Board assumed sponsorship of mobilization planning, the Planning Branch, Office of the Assistant Secretary of War, continued to do the bulk of the work. There were changes in the organizational structure of the Planning Branch which were designed principally to correlate the framework of the Planning Branch with the Army and Navy Munitions Board. It was not until after the United States entered World War II that the Planning Branch under that name disappeared as an indirect result of the creation of the Office of the Under Secretary of War and most of its functions were assigned to a new Resources Branch in the Office of the Under Secretary.[10]

The Army Industrial College

During the first years of the existence of the Planning Branch, officers newly assigned to it were instructed and indoctrinated by intensive reading of the World War I records of the War Industries Board and the other mobilization agencies of that war, as well as by all studies made by the Planning Branch. This indoctrination by reading, which required at least half a year, had to be completed before the officer was put to work on mobilization planning. Several farsighted officers suggested to Assistant Secretary of War Dwight F. Davis in 1923 that a school be organized to train officers for work in the field of industrial mobilization.[11] Assistant Secretary Davis recommended this to Secretary of War Weeks whose approval was followed by the official establishment, on 25 February 1924, of—

> . . . A college to be known as the Army Industrial College ... for the purpose of training Army officers in the useful knowledge pertaining to the supervision of procurement of all military supplies in time of war and to the assurance of adequate provisions for the mobilization of materiel and industrial organizations essential to wartime needs.[12]

The same general orders assigned supervision of the fledgling Industrial College to the Assistant Secretary of War, rather than to the General Staff which supervised all other general service schools.

The initial student body had nine officers; the initial course was for five months. But from these beginnings, this school, primarily for staff officers, expanded to a position in the fields of grand logistics and mobilization planning analogous to the Army War College's position in the field of military strategy and tactics.

The Industrial College continued to expand and to grow in stature in its specialized field of military education. As its prestige increased, the Navy, the Marine Corps, and the line of the Army requested and were allotted student quotas. But resistance to the college within the Army for some years discouraged able officers from attending for they felt that graduation from such a school would have less professional advantage than graduation from the Army War College. After the

middle of the 1930's, the Industrial College's prestige had increased to a degree that officers sought admission there as well as at the Army War College realizing that the two schools were mutually beneficial.

The curriculum at the Industrial College dealt primarily with practical fundamentals. Special lectures included business leaders in various fields who in the closed sessions at the College spoke freely (business leaders from the first gave the college full cooperation) and faculty members from eminent educational institutions, as the Harvard Graduate School of Business Administration and the Carnegie School of Technology. Many of the study subjects assigned to committees at the Industrial College concerned current problems of the Planning Branch, and the committee solutions in many instances, were of solid, practical assistance to the Planning Branch.[13] The Assistant Secretary of War felt, in 1938, that the commendable progress of Army-Navy cooperative planning, which occurred during the 1930's[14] was attributable to ". . . the fact that we have taken into the [Industrial] College the Navy and Marine [Corps] officers detailed, not as guests but on exactly the same basis as our own students."[15]

The Army and Navy Munitions Board

The third mobilization planning agency to emerge after World War I was the Army and Navy Munitions Board, which was suggested by the Assistant Secretary of War in a memorandum dated 15 February 1922. The proposal was approved by the Secretary of War and the Secretary of the Navy on 29 June 1922. The Army and Navy Munitions Board consisted of the Assistant Secretaries of War and Navy with such assistants and committees as they considered necessary.[16] On 7 October 1922, a joint letter prepared by the Assistant Secretaries and approved by the Secretaries outlined the committees to be organized under the new Board. The creation of the Army and Navy Munitions Board and its subsidiary committees was announced in War Department General Orders No. 51, 29 November 1922, which also established its mission as ". . . coordinating the planning for acquiring munitions and supplies required for Army and Navy Departments for war purposes or to meet the needs of any joint plans" and of ". . . evolving a suitable legislative program which will enable the procurement program to be put into effect."

It was clearly understood by both War and Navy Departments that the Army and Navy Munitions Board was not subordinate to the Army and Navy Joint Board but was parallel to it. Actions contemplated and decisions made by the Munitions Board would be referred to the Joint Board for comment before being sent to the Department Secretaries but only when such actions and decisions affected joint war plans.[17] For the first 10 years of its existence the Munitions Board had no power and very little life because of disagreements between the Army and Navy planners. The Army favored a general mobilization plan; the Navy, more nearly on a mobilization footing, was interested in specific color plans. For years there was no meeting of minds, and in this impasse the Munitions Board stagnated.

The General Staff, faced with no effective means for coordinating planning with the Navy, went ahead for many years preparing and revising general mobi-

lization plans without including the Navy in those plans. The one notable example of joint planning was in connection with selective service which was handled by the Joint Army and Navy Selective Service Committee. The Planning Branch, Office of the Assistant Secretary of War, went ahead by itself with economic mobilization planning. As this planning matured there was increasing concern with the obvious difficulty of organizing industrial production and allotting facilities without making provision for the Navy which, in time of war, would so clearly require an appreciable portion of resources, industries, and facilities. In 1930, Maj. Dwight D. Eisenhower, in a study prepared for Brig. Gen. George Van Horn Moseley, pointed up the problem:

> One of the difficulties encountered in agreeing upon an organization, is the lack of close cooperation and coordination (or rather lack of mutual understanding) between the Army and the Navy. It is useless to assert the fault lies wholly with either side . . . above all, lack of appreciation in the highest positions of the great Importance and deadly seriousness of the problem involved, have prevented that meeting of minds between the personnel of these two departments which is a prerequisite to a successful solution.[18]

The early months of 1930 marked the low point in Navy aloofness to industrial mobilization planning. The plan for industrial mobilization which the Planning Branch completed in 1930 pointedly referred to the lack of Navy cooperation in its preparation.[19] After June 1930 a more cooperative policy on the part of the Navy was noted which was evidenced by the furnishing to the Army planners lists of facilities which the Navy considered essential for some of its production, and by the establishment of joint machinery for coordinating the industrial plans of the two services.[20] By 1931 the Assistant Secretary of War could state in his annual report: "I am particularly gratified to report that the procurement activities of War and Navy Departments are being constantly brought into close co-ordination."[21]

In February 1932 the Army and Navy Munitions Board was reorganized to consist of the Assistant Secretaries of War and Navy, an Executive Committee (composed of the executive to the Assistant Secretary of War and the director of the Planning Branch representing the War Department and the director of the Material Division and the chief of the Procurement Planning Section of the Material Division from the Office of Naval Operations representing the Navy Department), a secretary and eight divisions: Price Control, Legal and Contract, Standardization and Specifications, Commodities, Facilities, Power, Transportation, and Labor. It was given definite missions to:

> a. Formulate and keep up to date such pertinent plans and policies as in the opinion of the two Departments [War and Navy] should be adopted by the Federal Government for coordinating and controlling national Industrial effort in an emergency.
>
> b. Assure the necessary coordination in procurement war plans of the two Departments, and in all plans, studies, and appendices thereto

> intended to facilitate the Government's efforts in emergency to promote orderly mobilization of industry.
>
> c. Form and direct the activities of such joint committees as may be necessary to consider, investigate, and make recommendations concerning pertinent subjects falling within the purview of the board's responsibilities.[22]

The Army and Navy Munitions Board in 1933 took over the sponsorship of the Industrial Mobilization Plan, and coordinated divergent Army-Navy viewpoints in that plan. This signal achievement of the Munitions Board was recognized by the War Department on innumerable occasions.[23] The Munitions Board also was responsible for the compilation of lists of strategic and critical materials.

The resurgence of the Army and Navy Munitions Board in the 1930's improved industrial mobilization planning and in a more tangible sense provided effective coordination between the Army and Navy in such planning. However, the Navy's concern still was primarily current procurement for a force in being since the Navy on M-day would actively go to war with ships and tools actually in existence. The Army, however, on M-day would have to start expanding rapidly and was primarily concerned with lining up industries and the national economy to insure future procurement for that tremendous expansion. In practice it followed, therefore, that although the Army and Navy were cooperating under the aegis of the Army and Navy Munitions Board which had taken over the responsibility of the Industrial Mobilization Plan, the bulk of the spadework on the plan continued to be done by the War Department through the agency of the Assistant Secretary of War's Planning Branch.

The Army and Navy Munitions Board existed without specific legal sanction (and consequently without specific appropriations) until 1 July 1939. Then the President directed that this board, along with certain other joint boards, should henceforth operate ". . . under the direction and supervision of the President" and that matters which the board could not settle by Army-Navy agreement should be forwarded to the President for decision.[24] The transformation of the Munitions Board into an executive agency gave it a permanent status which the Secretary of War or the Secretary of Navy could not change. Congress gave legal recognition to the Munitions Board on 7 July 1939 by a statute directing the Secretaries of War, Navy, and Interior to act jointly through the Army and Navy Munitions Board to stockpile certain strategic and critical materials.[25] As in the case of other industrial planning agencies, the Munitions Board, when war became more imminent, moved perceptibly from planning activities to active operations as the coordinator and agent for the services in actual procurement.[26]

Early Implementation of Industrial Planning

The term "industrial mobilization" was used as early as 1923 to distinguish certain phases of mobilization planning in the Office of the Assistant Secretary of War from that planning connected purely with procurement and from the military mobi-

lization planning being done by the General Staff. One of the earliest definitions for industrial mobilization was: "Mobilization of industry for military purposes during a national emergency is the operation of adjusting peace-time energy and industry to meet the essential requirements of national life, and the maximum requirements of military effort, with a minimum disturbance of normal conditions."[27]

The intent of Congress in the National Defense Act of 1920 was that the fumbling in World War I industrial preparedness measures was not to be repeated. Industrial mobilization planning was to make sure that munitions would be speedily, economically, and effectively supplied when Congress, at the outbreak of war, voted the money to buy them. At first, the Assistant Secretary and his planning aides concentrated on a side issue—procurement planning—to the nearly complete exclusion of industrial mobilization planning. To some degree, perhaps, procurement plans constituted in intermediate goal which had to be attained before the ultimate goal of an industrial mobilization plan could be reached.

The earliest of the written plans was prepared by the Planning Branch in February 1922; it consisted of an outline for a plan to be prepared in three volumes. Volume I would consist of tables of organization for the wartime operations of the Office of the Assistant Secretary of War, of the seven technical-supply services throughout the Zone of the Interior, and of the civilian superagency, analogous to the World War I War Industries Board. Volume II would consist of legislative measures necessary to implement other provisions of the overall plan. Volume III would contain brief, descriptive instructions on how to determine requirements for raw materials, factories, labor, transportation, and power, but would not include the requirements themselves. Of these three volumes contemplated in this initial outline, partial data had already been prepared for Volume I only.[28]

It was during this period that disagreements arose between the General Staff and the Planning Branch concerning requirements, the Planning Branch insisting that the General Staff mobilization plans demanded more materiel than could be procured. The argument had become heated when the Planning Branch insisted that the initial task was for the General Staff to determine exact requirements down to all specific items and the General Staff insisted that it would not lower its sights until the Planning Branch camp up with definite figures on what could be procured. In those early days the Planning Branch had available so little data it was easier to fight the problem than to solve it. As a result of the General Staff-Planning branch friction, the Assistant Secretary and his Planning Branch intensified and expedited their planning.

Notes

[1] This chapter on industrial mobilization planning 1920–39 is based in great part on the excellent studies prepared by the Historical Section, Office of The Quartermaster General, during World War II. Extensive use has been made of Harold W. Thatcher's, *Planning for Industrial Mobilization, 1920–1940* ("QMC Historical Studies," No. IV [Washington, 1943]). Background material was obtained from Thomas M. Pitkin and Herbert R. Rifkind's *Procurement Planning for the Quartermaster Corps, 1920–1940* ("QMC Historical Studies," No. I [Washington, 1943]).

[2] Act of June 4, 1920. 41 *Stat.* 764.

[3] For a more complete discussion see ch. XII, this study. In Sep 21, the SW, in a directive to the ASW, assigned to him sole responsibility for planning economic mobilization; this directive served to confirm definitely what, in some respects, may have been only implied by the Harbord Board recommendations and by WD GO 41, 1921; see also: *Annual Report of the Secretary of War, 1922.*

[4] AR 850–25, 15 Dec. 24.

[5] In a 1927 study for the CofS, G–4 estimated that during the fiscal years 1927–29 somewhere between $100,000 to $350,000 annually had been allocated to the ASW for procurement planning. See: Memo, G–4 to CofS, 25 Oct 27. G–4/22986 in AG File 281. National Archives.

[6] Lecture, Col H. K. Rutherford, Ch., Pl Br, OASW, before the Army Industrial College, "The Planning Branch, OASW," 6 Jan 40. Industrial College of the Armed Forces Library.

[7] Four other members of the class at the Army War College were assigned to assist Col Ferguson after their graduation. See: Minutes of Meeting of Orientation Conference No. 14, 4 Dec 34, sub: Planning Branch. Planning Branch Records. Filed with Records of the Office of the Secretary of War. National Archives. Hereafter cited as Pl Br Rec, OSW. National Archives.

[8] Thatcher, *op. cit.*, p. 16.

[9] The Planning Branch was initially subdivided into 10 sections: Statistical, Requirements, Industrial Policy, Purchase, Production Allocation, Labor, Finance, Foreign Relations, Transportation, and Storage. See: *Report of the Secretary of War, 1921*, p. 120.

[10] Office Order No. 78, Planning Branch, OUSW, 19 Feb 42. Pl Br Rec, OSW. National Archives.

[11] See: Memo, Maj Gen James H. Burns to Commandant, Army Industrial College, 21 Feb 41. Copy in HIS 400.3 (22 Aug 53). Spec Studies, History of Mil Mobilization. OCMH. Gen Burns was one of the active leaders in the movement to establish the Army Industrial College.

[12] WD GO 7, 5 Feb 24.

[13] The class of 1938–39 provided valuable assistance in the revision of the annexes to the 1939 Industrial Mobilization Plan; see: Memo, Col C. Hines to ASW, 3 Oct 39. Pl Br Rec, OSW. National Archives.

[14] Most notably evidenced by the functioning of the Joint Army and Navy Munitions Board.

[15] "Annual Report of Assistant Secretary of War" *Annual Report of Secretary of War, 1940*, p. 8. For a comprehensive account of the history of the Industrial College see studies written by Cols Ferguson, McCain, Hagen, Kelton in Pl Br Rec, OSW. National Archives. See also: Thatcher, *op. cit.*, pp. 23–42.

[16] Lecture, Comdr Paul Hendren, before the Army Industrial College, "Organization and Functions of the Army and Navy Munitions Board," 19 Feb 36. Industrial College of the Armed Forces Library.

[17] Hendren, lecture, *op. cit.*, 19 Feb 36. The Joint Army and Navy Board had been set up in 1903 to make recommendations to the Secretaries of War and Navy on matters involving cooperation of the Army and Navy.

[18] Maj Dwight D. Eisenhower, "Peace Time Difficulties of Procurement Planning," Jan 30. Pl Br Rec, OSW. National Archives. As cited in Thatcher, *op. cit.*, pp. 44–45.

[19] Plan for Governmental Organization for War and for Industrial Mobilization May 1930, app. 1. Pl Br Rec, OSW. National Archives.

[20] Memo, Ch, Pl Br, OASW (Col J. D. Fife) to Gen Moseley, 19 Jun 30. *Ibid.*

[21] "Annual Report of the Assistant Secretary of War," in *Annual Report of Secretary of War*, 1931, p. 25.

[22] Industrial Mobilization Plan, 1933, app. VII, p. 70.

[23] "Report of the Assistant Secretary of War" in *Annual Reports of Secretary of War*, 1934, p. 28.

[24] *1939 Supplement to the Code of Federal Regulations of the United States of America* (Washington, 1940) p. 259.

[25] Act of July 7, 1939. 53 *Stat.* 811.

[26] "Report of the Under Secretary of War for the Fiscal Year Ended June 30, 1941," in *Annual Report of the Secretary of War, 1941*, p. 40.

[27] AR 120–10, 1924.

[28] Outline of War Plans, Feb. 22. Pl Br Rec, OSW. National Archives.

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Logistics and World War II Army Strategy

Introduction. Col. H. F. Sykes, Jr., using the vehicle of the Victory Program of 1941, discusses the interrelationship of logistics, force structure, and grand strategy in World War II, with special emphasis on the limitations placed on strategy by a nation's industrial production capacity and manpower. He concludes with the observation that the manner in which the United States fought World War II was determined in large part by production decisions taken in the early days of the war and that a single set of requirements tied to a single strategic plan must be avoided inasmuch as many courses of action may have to be supported.

The relationship between strategy and logistics usually is portrayed as though strategy clearly is the father and logistics the son. For example, paragraph 34 of Field Manual 101–51, *Department of the Army Planning and Programming Manual*, states in part:

> The purpose of the Joint Strategic Objectives Plan is to: a. translate national policy of the United States into terms of military strategy and objectives which are considered attainable by the midrange period. . . . b. provide guidance for the pre–D-day development of forces and resources required to support the strategic concept.

Yet, in his message to Congress on 6 January 1942, President Roosevelt said:

> The superiority of the United Nations in munitions and ships must be overwhelming, so overwhelming that the Axis nations can never hope to catch up with it . . . and so in order to attain this overwhelming superiority the United States must build planes and tanks and guns and ships to the utmost limit of our national capacity.

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The President was seeking the greatest possible total of munitions without regard to a strategic plan.

In this article the interplay between the grand strategic and logistic decisions of World War II will be explored in order to define more clearly the relationship between the two; the plans and actions of the United States Army will be the principal backdrop.

The author intends to show conclusively that in World War II the role of strategy and logistics was not that of father and son as mentioned above, but almost the reverse; that the basic United States strategic-logistic decision was to "outproduce the foe"; that the great international conferences of that war allocated available resources in support of short-range plans, but did not give long-range strategic or logistic guidance and, finally, that in the United States Army the long-range guidance needed in our production program was developed on the initiative of a logistic agency.

To accomplish this, let us closely examine the Munitions Program of 1940, the Victory Program of 1941, the Strategic Conferences of World War II, our 1942–43 Production Goals, and the adjustments necessitated by these programs.

An appropriate starting point for a review of United States strategy in World War II is the Rainbow series of plans prepared in 1939. Five in number, they covered the concepts of preventing violation of the Monroe Doctrine, protecting the United States, her possessions and sea trade; sustaining the authority of democratic powers in the Pacific zones; securing control of the western Pacific; affording hemisphere defenses by sending United States task forces if needed to South America and to the eastern Atlantic; and, lastly, providing for sending forces ultimately to Africa or Europe in order to effect the decisive defeat of Germany or Italy or both.

As a measure of our military readiness at that time, it should be noted that in early 1939 the Regular Army was authorized a strength of 210,000. By the following September a strength of 227,000 had been authorized with mobilization plans calling for an initial force of 750,000 men. Matériel planning and production programs lagged below even these levels.

In May 1940 the President appointed an Advisory Commission to the Council of National Defense. William S. Knudsen, who was the production authority on the committee, promptly sought both long- and short-range guidance from the Army and Navy to help him determine the munitions productive capacity that we needed and how rapidly we would need it. This request resulted in a proposed munitions program, based on equipping an Army of 1 million men by 1 October 1941 and an Army of 4 million by 1 April 1942. The scope of this program was reduced about 30 percent by the President before he approved it—the cost was estimated at 7.3 billion dollars.

Shortly after this program was approved Mr. Knudsen informed the President and the War Department that industry could not meet the goals. A choice had to be made between equipping a 2-million man Army soon, or a 4 million-one much later. The Chief of Staff chose the former and a revised program was drawn up calling for a 6 billion-dollar program. The President was unwilling to accept this figure and, on 10 July 1940, offered Congress a program slightly under 4 billion.

This program was based on the equipment needed to: procure reserve stocks of all items of supplies needed to equip and maintain a ground force of 1 million men on combat status (by 30 September 1941); procure all reserve stocks of the important longtime items of supplies needed to equip and maintain a ground force of 2 million men on combat status (by 31 December 1941); and create facilities which would permit a production sufficient to supply an army of 4 million men on combat status (no target date set).

This program originally was based on War Department plans current at the time and, therefore, represented an attempt to obtain the resources needed to support a "strategic" plan. However, it was changed during the last 10 days of June 1940 into a "production" program that the Advisory Commission thought industrially feasible and a dollar total that the President thought politically feasible.

That this program fell short of meeting possible commitments was discussed in a War Plans Division (WPD) paper on 25 September 1940. Serious shortages of men and matériel were documented in this paper but no apparent action resulted.

A new note was introduced by the President in a fireside chat on 29 December 1940 when he used the phrase, "We must be the great arsenal of democracy." This idea appears to have been the direct result of a long and detailed plea for assistance sent the President by Prime Minister Churchill on 8 December 1940. While this letter was a plea for United States assistance to assure the survival and independence of the British Commonwealth, it gave no strategic military plan to accomplish that objective. It did, however, give emphasis to the production problem in these words:

> It takes between 3 and 4 years to convert the industries of a modern state to war purposes. Saturation point is reached when the maximum industrial effort that can be spared from civil needs has been applied to war purposes.

By 16 December 1940 President Roosevelt had reached a decision on aiding Great Britain. At his press conference on that day he used the illustration of loaning a length of garden hose to a neighbor when his house is on fire. From this beginning there arose the great system of lend-lease through which so much material was to flow to our Allies during the war.

This support of our Allies was, of course, a great part of our total war effort. However, the production load placed on the United States under this system was not, and could not have been, related to any strategic plan of the United States or even of the Allies taken as a whole. This resulted from the fact that production demands placed upon the United States through lend-lease were residual demands for each ally. They were deficits existing after each claimant had made his own internal supply requirements balance and, therefore, there could be no over-all pattern or balance.

British staff representatives arrived in the United States late in January 1941 to discuss the best methods by which the United States and the British Commonwealth could defeat Germany and her allies in the event the United States should be compelled to enter the war.

As a result of these staff discussions, a paper outlining a world strategy for United States–United Kingdom forces was prepared. Known as ABC–1 (27 March 1941), it contemplated a possible buildup of large air and land forces by the United States for major offensive operations against Germany and her allies. This was to remain the primary offensive objective even though Japan should enter the war. However, it was not approved by the heads of government and was, therefore, only a military staff guide.

These discussions and the resultant United States plans under Rainbow 5 clearly made a choice of Germany over Japan as the principal foe should the United States enter the war. The choice had to be made based on logistics—we simply could not have mustered sufficient effort to deal with both major enemies simultaneously. Thus *logistics provided the frame within which the first great strategic decision was made.*

Victory Program 1941

Everyone seemed to be unhappy in one way or another about the munitions production program discussed above and several actions were soon underway to change it. For instance, requests under lend-lease from the United Kingdom led to a recommendation within the War Department that a single planning agency be created to prepare a *supply plan to ensure victory*. Although this proposal was brushed aside at the time, it is the apparent forerunner of the plan finally adopted.

On 18 April 1941 Under Secretary Patterson, in a memorandum for the Secretary of War, clearly suggested that we should gauge our munitions program against a presumed enemy munitions effort. The "use" to be made of the munitions (a strategic plan) was secondary to the "amount." It was a logical extension of the concept of an "Arsenal for Democracy."

The Chief of Staff appears to have been concerned at this time with the requests and pressures that were flowing in from many sources and he asked the WPD to prepare a new strategic estimate based on the capabilities of Germany, Japan, Italy, and Great Britain.

In May 1941, at a conference with the WPD, G3, and G4, the Chief of Staff mentioned the desire of the Office of Production Management to increase and continue its orders in order to utilize industry to its fullest extent. At the same time he was reluctant to move too far for fear of building up stocks of obsolescent items.

Within the General Staff there was a concern over the lag in the delivery of equipment. As of May 1941 G4 estimated that we were a year behind the expectations of 1940, and that it would be mid-1942 before the initial protective force could be equipped.

All of these concerns were brought to a head on 9 July 1941 in a Presidential directive which called for an estimate of the munitions and mechanical equipment needed "to exceed by an appropriate amount that available to our potential enemies."

It was indicated that the estimates were wanted for the establishment of industrial capacity goals. Work which had begun under the earlier directive of the Chief

of Staff was accelerated by this directive; the final product came to be known as the Victory Program. It was based on the assumptions that no extensive United States Army operations would be underway before 1 July 1943; that the strategy of Germany, priority target 1, Japan, secondary, would be followed; that manpower availability would be the key limiting resource with an ultimate ceiling for the Army and Air Corps of 8,795,658; and that the peak number of major combat units of the Army would be:

Units	*Proposed*	*Actual (1945)*
Infantry Divisions	83	66
Armored Divisions	61	16
Airborne Divisions	10	5
Mountain Divisions	10	1
Motorized Divisions	51	0
Cavalry	0	1
Total	215	89

Since the composition of the troop list affected in a large measure the quantities of different types of matériel needed, the difference between the list used as a basis for computations of the Victory Program and the list of those actually operational indicated the production adjustment problems to be solved.

It should be noted that the preparation of a munitions production program without a direct tie to strategic plans did not go unchallenged. On 5 August 1941, WPD addressed a memorandum to Mr. McCloy in which it was stated that "we must first evolve a strategic concept of how to defeat our potential enemies and then determine the major units required."

On 30 August 1941 the President asked for recommendations concerning the distribution of expected United States production of munitions between the United States, Great Britain, the Soviet Union, and other recipients of aid until 30 June 1942. He also requested general conclusions as to the over-all production effort of important items needed for victory, on the general assumption that the reservoir of munitions power available to the United States and her friends was sufficiently superior to that available to the Axis Powers to ensure their defeat.

On 10 September 1941 the Army's estimate was submitted as a unilateral document since agreement had not been reached with the Navy. A Joint Board Estimate was submitted 2 weeks later in which not only separate requirements were given but a major split was indicated between the Army and Navy as to the timing and magnitude of the Army effort.

On 6 January 1942 the Victory Program was redesignated by the Deputy Chief of Staff as the "War Munitions Program." This program determined the major outline of the munitions produced in 1942 and 1943.

While none of the above actions, of themselves, excluded the use of a strategic plan, the keynote was "outproduce the foe." How well we did this can be gleaned from the following summary of United States aid to our Allies as reported in General George C. Marshall's 1943–45 Biennial Report:

> Not only did the Nation's industrial establishment equip our Army, but it also contributed heavily to the hitting power of the other United Nations. . . . Translated into these terms [dollar cost of equipment] . . . the arms alone turned over to our Allies would equip 588 armored divisions or 2,000 infantry divisions.

In light of the foregoing, let us now turn to the great strategic conferences of World War II which, in setting the pattern for offensive actions, *allocated available resources in support of short-range plans and did not give long-range strategic or logistic guidance.* In reviewing them it is essential to keep in mind that major changes in production programs could not be made quickly, since lead-time for even the simpler military items was on the order of 6 months. The following are the great strategic conferences with the salient features of each:

Washington, December 1941, Arcadia.—This conference set the stage for United States–United Kingdom operations; confirmed the general strategy of: defeat Germany first, hold Japan.

London, April 1942.—Western Europe was accepted as the most suitable theater for a main effort against Germany. Planning for an invasion in 1943 was authorized. Decision to hold against Japan was reaffirmed. Emergency diversionary landing in Europe in 1942 was considered if needed to allow the Soviet Union to continue the war.

Washington, June 1942.—North African operation for November 1942 was approved; major invasion of Europe was postponed.

Casablanca, January 1943.—Decision was made to intensify the bombing effort against Germany and to renew the buildup for the invasion of Europe. (It should be noted that a planning staff for the European invasion was not established until April 1943.) Invasion of Sicily (July 1943) was approved. Moderate action against Japan in the Aleutians and Midway areas was also approved.

Washington, May 1943, Trident.—Confirmed the intensification of the bombing of Germany and proposed concentration of 29 divisions in the United Kingdom for an invasion in May 1944. Operations in the Mediterranean were to continue to include the invasion of Italy. Operations against the Japanese were to continue. General Marshall said of this conference:

> This meeting . . . may prove to be one of the most historic military conclaves of this war, for here the specific strategy to which the movements of the land, sea, and air forces of the Americans and British Allies conformed was translated into firm commitments.

In July 1943 the Combined Chiefs of Staff (United States–United Kingdom) received the proposed plan for an invasion of Europe in the spring of 1944.

Quebec, August 1943, Quadrant.—Agreed to continue planning for the invasion of Italy (for September 1943), and for the invasion of Southern France in conjunction with the Normandy operation. Operations against Japan were to be continued in New Guinea, the Gilberts, and the Marshalls. The plan for the invasion of Western Europe was approved. It should be noted that the plan for the

invasion of Europe was approved 9 months before the invasion was scheduled to take place.

Cairo, November 1943, Sextant.—Invasions of Western Europe and Southern France were to have priority over all other operations. Consequently, advances in Italy would be limited and there would be no Balkan effort. Operations against the Japanese in the Marianas were approved. General Eisenhower was selected as Supreme Commander at this conference. It was at his insistence that the attack was broadened and the assault craft requirements increased from 5 to 7 divisions. This resulted in a month's delay in the Normandy assault. It was also necessary to delay the invasion of Southern France in order to get more landing craft for Normandy.

Quebec, September 1944, Octagon.—Plans were laid for shifting to a 1-front war against Japan while finishing up in Europe and Italy. By virtue of information received while the conference was in session, it was decided to bypass the Southern Philippines and go directly to Leyte in October 1944.

Yalta, February 1945, Argonaut.—Final plans for the destruction of Germany and the invasions of Iwo Jima (February 1945) and Okinawa (April 1945) were approved. It may be noted that this was only 3 months before the final surrender of Germany on 7 May 1945 and almost coincided with the Iwo Jima operation.

Berlin, July 1945, Terminal.—The use of atomic weapons against Japan was approved. Soviet assistance against the Japanese was accepted. It should be noted that the invasion of Europe was a perennial topic of discussion at these conferences. Not only was it the biggest single operation of the war but also seemingly the most uncertain. Each time a solemn agreement was reached something came along to change the situation (principally that of the British interest in the Mediterranean).

From a review of these conferences, all of which, except the first two, were held by the heads of government in person, it is evident that the grand strategic decisions were short range in character. In general, they dealt with the use and manipulation of resources which were already available or in sight. They did not deal with the creation of resources necessary to carry out a future plan.

It appears then that *the* basic strategic, as well as logistic, decision of World War II was made when the Victory Program was formulated with the slogan, "outproduce the foe."

The Army Service Forces (ASF) established on 9 March 1942 (as SOS) supplied the ground combat forces on one hand and dealt with industry (and the civilian control agencies) on the other. One of its key problems is worthy of a brief review here.

ASF, since it came into being after the Victory Program had been developed and approved, inherited a production program, an industrial buildup, and a philosophy of maximum production. It did *not* find a long-range strategic plan against which to measure progress and by which to guide production.

Soon after ASF began to function it discovered that the Presidential goals contained in his 6 January 1942 message to Congress were a major upsetting factor.

They were expressed in terms of goals to be reached for a selected few items in 1942 and 1943.

These goals were well above those in the Victory Program and were accepted by the Army as a foundation for a recalculation of all other items on a balanced program basis. This resulted in a large increase in the Army program. On the other hand, the staff of the War Production Board (WPB) had been attempting to make an estimate of possible production of munitions in 1942 and 1943. When the new Army figures were received in February 1942, there was strong feeling in the WPB that the goals were far beyond reach.

The basic point was well stated at a meeting of the WPB Planning Committee on 2 March 1942, when it was suggested that there are two possible approaches to an appraisal of military objectives. One is to arrive at a feasible military production estimate by determining the total production of finished articles of which the national economy is capable, and subtracting from this total the irreducible minimum of production required for civilian requirements. The second approach is to analyze qualitatively the specific military requirements as compared to the specific resources for production. It was then explained that the over-all quantitative approach should precede the categorical, qualitative analysis in order that the outer limits of total military requirements could be fixed.

Item	*1942*	*1943*
Planes	60,000 (45,000 combat)	125,000 (100,000 combat)
Tanks	45,000	75,000
Antiaircraft Guns	20,000	35,000

Here it might be well to sound a note of caution as to "irreducible minimum civilian needs." The Chairman of WPB in his final report, Wartime Production Achievements, stated:

> . . . we continued to provide the civilian economy with a greater total amount of commodities and services than in such good prewar years as 1937 or 1939. . . . Throughout the war the people at home were subjected to inconvenience, rather than sacrifice.

After further study within WPB it seemed clear that either the Presidential goals would have to be lowered or the military program reduced (although that would unbalance it). This situation was reported to the President who appeared to agree that reductions were necessary in the totals but *not* in his announced goals. He accepted a total munitions production for 1942 of about 45 billion dollars. This information was given to the services at a 7 April 1942 meeting of the WPB. No protests seem to have been registered.

Although the President also agreed at that time to a limit of 75 billion dollars for 1943, the military program continued to creep up until in mid-July 1942 it was approaching 90 billion dollars. Since the unfilled portion of the 1942 program might have been some 5 billion dollars, the apparent deficit was far beyond an "incentive," and threatened the accomplishment of the entire program. When this view was

expressed to the services, the reactions were quite violent and led to a bitter exchange of correspondence and views.

At the suggestion of General Somervell, the matter finally was taken up with the Joint Chiefs of Staff (JCS) on 19 October 1942 (by then the 1943 programs had reached a total of nearly 93 billion dollars), who reduced the totals to approximately 80 billion dollars. The JCS felt that this was a minimum program and provided "for munitions for the Armed Forces which are balanced within themselves and against each other so far as production facilities will permit." They also indicated that this program required that *military tasks for 1943–44 be restricted to the capabilities of production.*



Brehon B. Somervell

These incidents have been cited because they indicate that the Production Programs of 1942 and 1943 were keyed to Presidential goals and to estimates of "production" capacity and not to a "strategic" plan.

The Victory Program, the January 1942 Presidential goals, the subsequent military programs, and the JCS modification of October 1942 were aimed at producing the maximum, feasible, balanced quantities of munitions of which we were capable and not at supporting a strategic plan. We had continued to set our sights on "outproduce the foe" on the assumption that we could outproduce him and that that would suffice.

Conclusions

In reviewing the Production Programs of 1940 and 1941 Bureau of the Budget statistics show that:

> . . . the whole production buildup of 1941 and 1942 was not, and could not be, based on strategy, because strategy was inevitably being constrained by our enemies and by the plight of our Allies. We were manufacturing munitions 'for the shelf' for equipping armies and squadrons, and not for specific operations the strength and date of which could *not* be forecast even by the chiefs of staff.

Further, in reviewing the great strategic conferences of World War II it was shown that the decisions came too late to be a guide to munitions production. As a consequence:

> The ASF was compelled to anticipate the plans and decisions of the CCS, the JCS, and the War Department General Staff (WDGS) in order to have sufficient lead-time to implement them.

It is believed that sufficient information has been given to support the thesis that we found it necessary in World War II to establish our entire munitions production program on the basis of an all-out production effort and not on the basis of a given strategic plan. We also found it necessary to adjust this production program as the war progressed on a short-range basis to take into account the fortunes of war. Outside of the basic decision to give priority in the use of our resources to the military effort against Germany, the other strategic decisions were all of such short range as to be useful only as modifications of going production programs and not as a measure of future production.

This . . . rapid buildup in production of munitions occurred in 1942 and, at a slightly lower rate, in 1943. This buildup reflected procurement and production decisions made late in 1940 and in 1941, long before the principal operations of World War II had been planned.

As a consequence, the manner in which we fought World War II was determined very largely by the production decisions that were made when the then Major Stratemeyer put together the outlines of the Victory Program. This is a splendid example of the fact that the projection of military requirements must be on the broadest possible basis in order to give a reasonable chance that the items that become available can support a wide range of alternative courses of action. It shows conclusively that we should shun the idea that a single set of requirements tied to a single strategic plan furnishes a proper basis for wartime production. We need instead a pattern of production which can support many courses of action while being precisely fitted to no one of them.

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Logistical Support of the Army in World War II

Introduction. This chapter from the final report of the Army Service Forces constitutes a brief overview of the logistical support of U.S. Army operations worldwide in World War II, with particular emphasis on the interrelationship of strategy and logistics. The arrangements for logistical support in each of the major theaters of operations are described in turn.

World War II was a war of logistics. Never before had war been waged on such varied, widespread fronts. Never had one involved so many men, so much matériel, nor such great distances. Never had combat operations so directly affected whole industrial systems and populations. Consequently, past experience provided little indication of the tremendous influence of logistics on strategy and operations, and little or no guidance on the techniques of broad scale logistic planning. Of necessity, these techniques were developed largely during the war. Logistics influenced, and in many cases dictated, considerations of strategy, whether the grand strategy of the United Nations or the strategy of a single campaign.

From the over-all standpoint, the major logistic problem of the war was the utilization of national resources in meeting the needs of the strategic plans formulated by the Combined Chiefs of Staff (United States–United Kingdom) for the complete defeat of Germany and Japan. These plans had to be translated into requirements for hundreds of thousands of items of equipment and supplies, in terms of specifications, time, and quantities. In turn, the latter had to be translated into terms of raw materials, manpower, and facilities and checked against available and prospective resources. The logistic practicabilities of the strategic plans thus were determined and adjustments made on the basis of capabilities. With limited raw materials and productive capacity, a proper balance was necessary between the various programs that included the building of cargo ships, aircraft, landing boats, naval vessels, and ground equipment, and the production of high octane gasoline.

Reproduced from United States Army Service Forces, *Logistics in World War II: Final Report of the Army Service Forces* (Washington, D.C.: Government Printing Office, 1948), pp. 32–55.

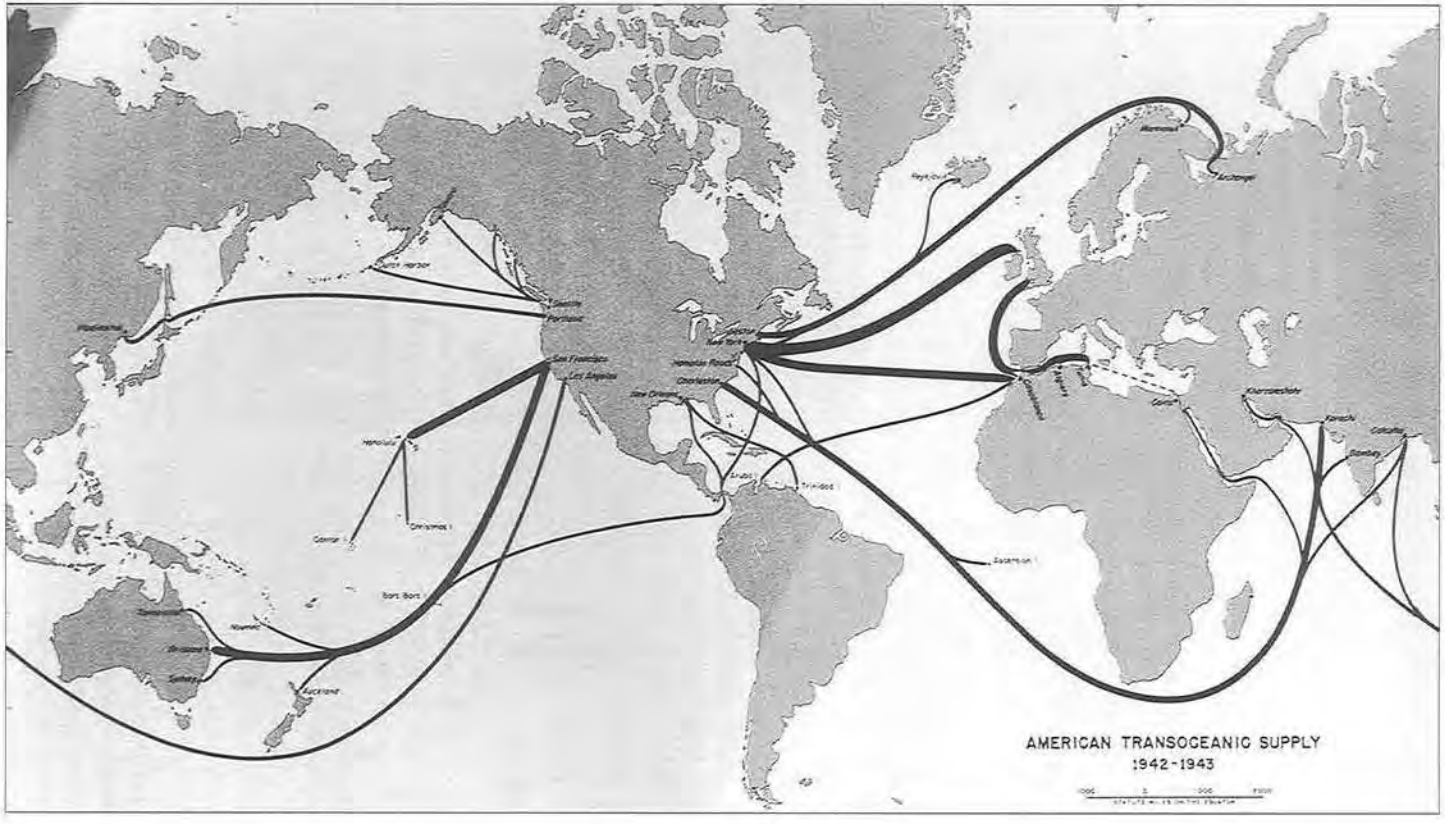
The grand strategy of the war was also dependent upon production schedules and shipping possibilities. Production programs were constantly adjusted and coordinated to conform to changing strategic priorities and operational needs.

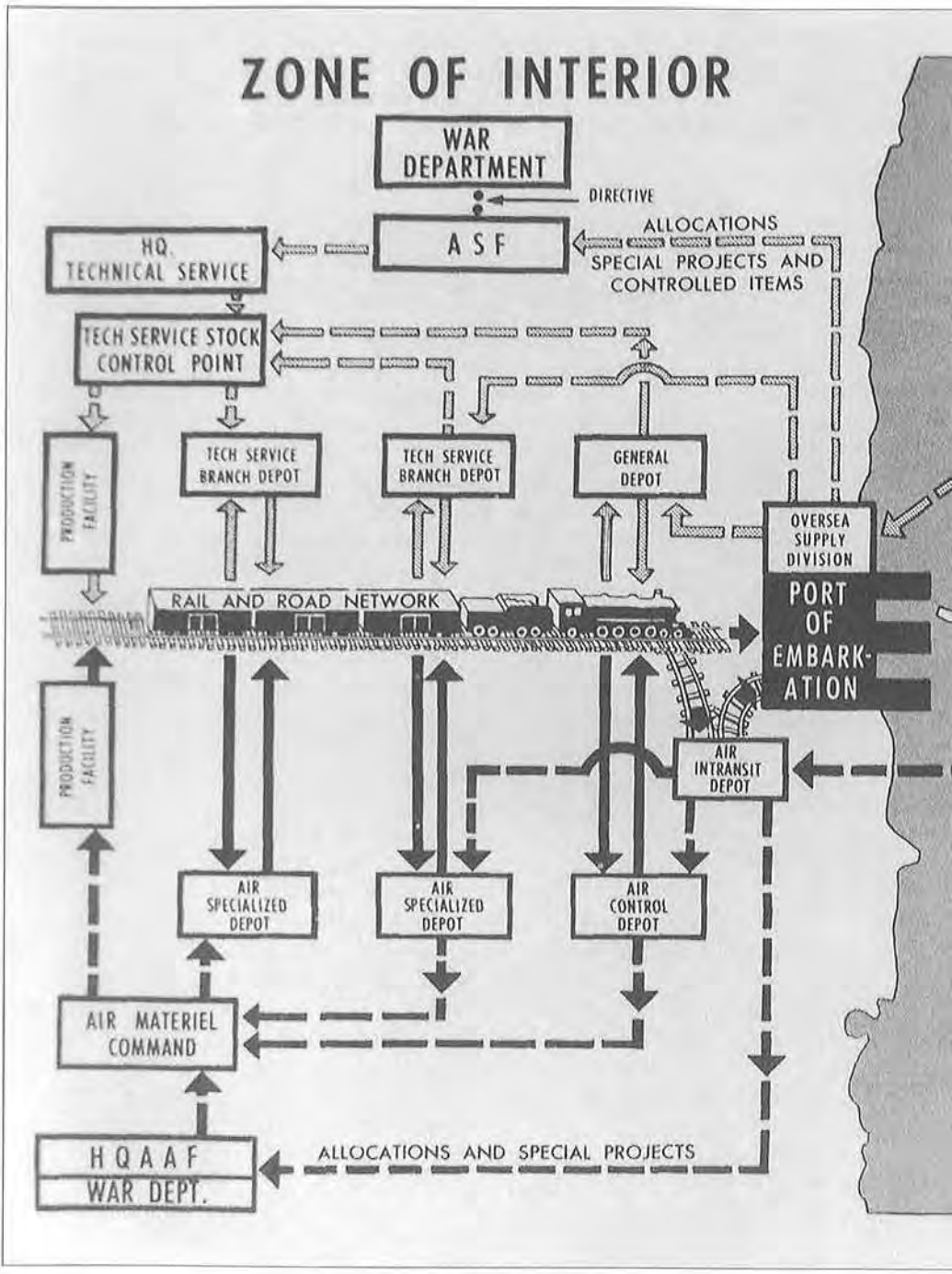
The adjustment of strategy to logistics was not confined to United States forces alone. The United States provided extensive logistic support through Lend Lease to all the United Nations. The assignment of finished munitions was governed by projected operational plans. The resources of the United States and Great Britain in munitions and shipping were largely considered as a pool for the support of the two nations. Just as strategic plans were combined, so also were some phases of the logistic activities in support of those plans.

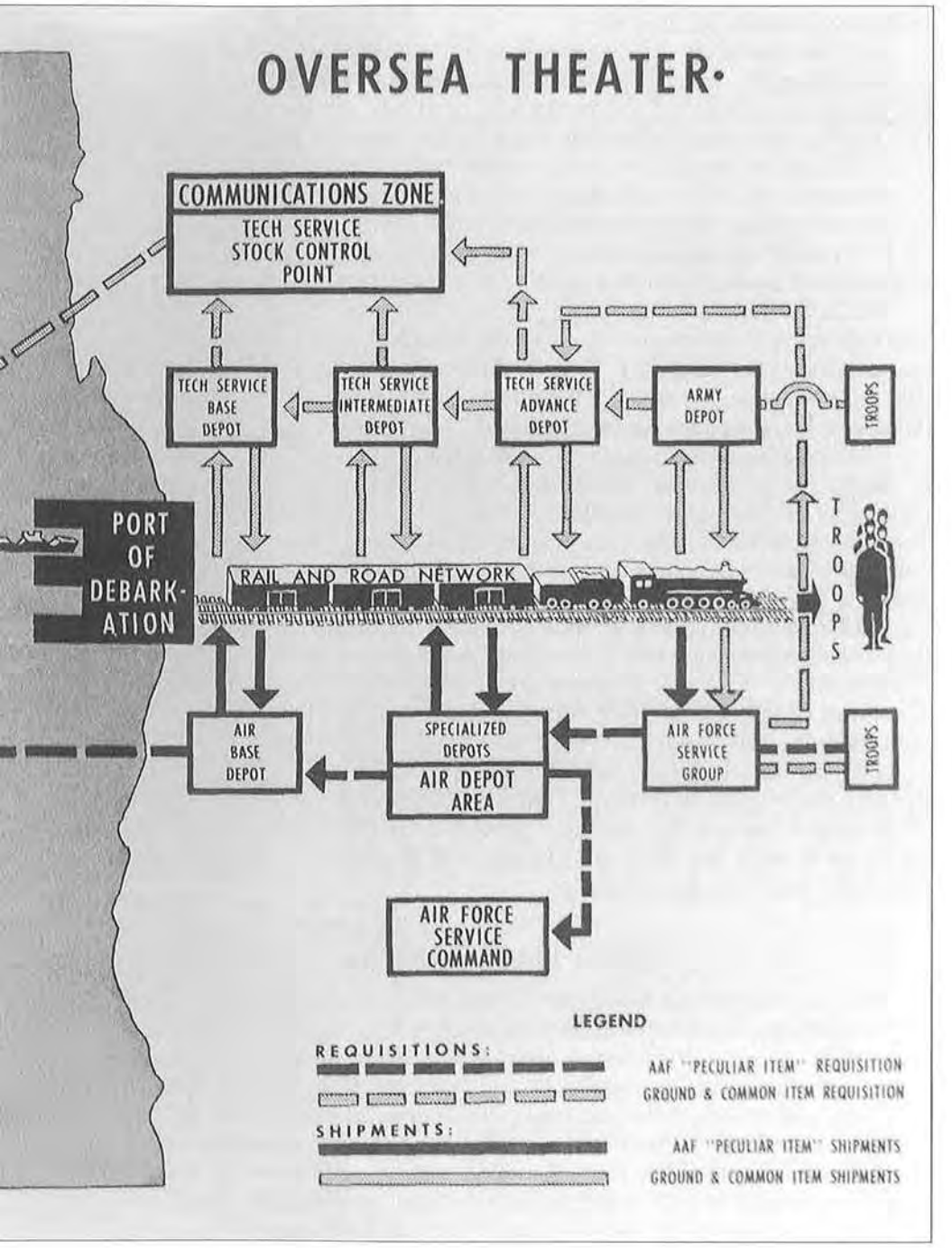
Throughout the war the Army Service Forces was the direct source of logistic information and guidance for the Joint Chiefs of Staff and for the Strategy and Policy Group, Operations Division, War Department General Staff. In the fall of 1943, the Joint Logistics Committee was organized as an agency of the Joint Chiefs of Staff. The Army Service Forces provided one member of this committee. A permanent committee, the Joint Logistics Plans Committee, was organized as the working agency of the Joint Logistics Committee; the Planning Division, ASF, furnished two permanent members of the former. Associate members from the War and Navy Departments, the Army Air Forces, the Staff Divisions, ASF, and the Technical Services prepared detailed studies for each specific problem studied by the Joint Logistics Plans Committee. The Army Service Forces furnished logistic information and guidance to the Strategy and Policy Group, Operations Division, WDGS, both independently and supplementary to that provided by the Joint Logistics Plans Committee.

The global nature of World War II, and the fact that the initiative was with the enemy through 1942 in the Pacific and well into 1943 in Europe, necessitated the preparation of detailed logistic studies for operations in almost every part of the world. Many of these studies served a negative purpose, either to indicate the logistic impracticability of operations in certain areas, or to show that expected results might be indecisive or incompatible with the cost in men and matériel.

No strategic plan could be drafted without a determination and evaluation of the major logistic factors: Were we able to assemble the necessary men, equipment, and supplies? Could we do this in time for movement to the initial assault? Could we continue our support of the operation? At what rate could men and supplies be placed in the target area? At what rate could the enemy move to counterattack? The answers to these questions involved detailed consideration of the availability of proper types of shipping; port clearance (as determined by port and beach capacities and the capacities of road and rail nets); the availability of suitable sites for rapid airfield construction; the availability of local resources, such as water, fuel, labor, and food; the availability of facilities, such as harbors, docks, warehouses, and power plants; and, finally, an assessment of the enemy's ability to place physical obstacles in our way, and of our ability to overcome them. The logistic effect of the proposed operation on campaigns in other Theaters also had to be determined. The timing of various operations was a major consideration. Alternative lines of action had to be considered in each logistic analysis in order


AMERICAN TRANSOCEANIC SUPPLY
1942-1943


ZONE OF INTERIOR
WAR DEPARTMENT
DIRECTIVE
ALLOCATIONS
SPECIAL PROJECTS AND CONTROLLED ITEMS
ASF
HQ. TECHNICAL SERVICE
TECH SERVICE STOCK CONTROL POINT
PRODUCTION FACILITY
TECH SERVICE BRANCH DEPOT
TECH SERVICE BRANCH DEPOT
GENERAL DEPOT
OVERSEA SUPPLY DIVISION
RAIL AND ROAD NETWORK
PORT OF EMBARK-ATION
PRODUCTION FACILITY
AIR INTRANSIT DEPOT
AIR SPECIALIZED DEPOT
AIR SPECIALIZED DEPOT
AIR CONTROL DEPOT
AIR MATERIEL COMMAND
HQAAF
WAR DEPT.
ALLOCATIONS AND SPECIAL PROJECTS


OVERSEA THEATER
COMMUNICATIONS ZONE
TECH SERVICE STOCK CONTROL POINT
TECH SERVICE BASE DEPOT
TECH SERVICE INTERMEDIATE DEPOT
TECH SERVICE ADVANCE DEPOT
ARMY DEPOT
TROOPS
PORT OF DEBARK-ATION
RAIL AND ROAD NETWORK
TROOPS
AIR BASE DEPOT
SPECIALIZED DEPOTS
AIR DEPOT AREA
AIR FORCE SERVICE GROUP
TROOPS
AIR FORCE SERVICE COMMAND
LEGEND
REQUISITIONS:
AAF "PECULIAR ITEM" REQUISITION
GROUND & COMMON ITEM REQUISITION
SHIPMENTS:
AAF "PECULIAR ITEM" SHIPMENTS
GROUND & COMMON ITEM SHIPMENTS

to balance the many factors involved, and to determine the most desirable course of action as well as its feasibility.

Each logistic study developed one or more "bottlenecks" that were decisive factors limiting the capabilities of our forces. The problem was then to devise ways and means for eliminating the bottlenecks or to redesign the operation to fit the limiting factors. It was the function of the logistic planners to discover any limitations, to ferret out the ways and means to overcome them, and to furnish the strategic planners with advice respecting feasibility and requirements. The logistic and operational aspects were complementary in the development of a plan of operations. A plan of operations was proposed. Logistic scrutiny revealed a limitation. The plan was amended. Further scrutiny of our ability to provide detailed support revealed additional limitations. The plan was further amended, until ultimately it was impossible to determine which of the logistic factors had the most decisive influence upon the final plan. The art of logistic planning involved the ability to determine accurately in advance the effect of time and space factors on an operational concept, thus insuring the practicability of final plans.

Strategically, it was essential to strike an early blow against Germany in order to relieve the pressure on Russia and Great Britain. Available resources were inadequate for full-scale, simultaneous operations against the Japanese and the European Axis. The shorter lines of communications in the Atlantic permitted the build-up of adequate forces for a decisive blow in the European Theater in much less time than that required in the Pacific. Time was also necessary for rebuilding the United States Navy in order to insure freedom of action in the Pacific. British and American naval forces were available for convoy purposes in the Atlantic where the threat of major naval engagements was more remote. The Combined Chiefs of Staff, therefore, decided that United States forces would be built up in the British Isles as rapidly as possible, the build-up to be followed by a combined assault across the Channel. The build-up was named Operation BOLERO; the assault and invasion, Operation OVERLORD. The United States meanwhile would assume the strategic defensive in the Pacific, using available resources to stem the Japanese advance and to prepare bases from which to launch the Pacific counteroffensive.

North African Campaign

Early in 1942 the position of the United Nations was precarious. The British, while regaining control of the air over England, were being forced to retreat toward El Alamein in Egypt. The advance of the Afrika Korps threatened the Suez Canal and also the air transport route to Russia and Asia. British losses in equipment were large and serious. It was necessary to withdraw some 300 tanks and 100 self-propelled guns from United States units in training for rush shipment to the British on the El Alamein line. The Army Service Forces shipped a total of some 38,000 tons of equipment in July 1942 "around the Cape" to Suez. Because one ship of this convoy was torpedoed, an additional 75 tanks and self-propelled weapons with a total of some 10,000 tons of equipment were dispatched. These items of equip-

ment contributed materially to British success in holding and later breaking through the line in the desert—which marked the turn of the tide against the German Army in Africa.

The Russians, long on manpower but short on equipment and supplies, were reeling under German blows. It was imperative to keep Russia in the war and actively fighting the bulk of the German land forces. This required the shipment of badly needed trucks, tanks, and guns at the expense of United States forces in training. The urgency of the situation made necessary the use of the costly northern convoy route and the establishment of the long and arduous supply line through the Persian Gulf.

An early operation by British and United States forces designed to relieve the pressure on the Russian front was most desirable. It would take more than a year to concentrate the necessary forces and equipment for a cross-channel assault. We could, however, take advantage of Axis weakness in French North Africa, and could concentrate forces there more rapidly than the Germans. This would draw sizable German forces from Europe, thereby affording some relief to Russia. Furthermore, it would provide bases for air cover for the vital Mediterranean supply route and would threaten the rear of the German Army in the desert. The Combined Chiefs of Staff decided that an attack would be made in North Africa in late 1942 and postponed the planned cross-channel assault.

The United States was already well embarked on BOLERO, and was committed to the shipment of available troops and supplies to the United Kingdom. The early concept of TORCH, the North African operation, envisaged a joint British-American task force to be mounted from the United Kingdom. Considerations influencing the early plan were the availability of troops in Britain, the short line of communications from England to North Africa, the corresponding saving in shipping, and the reduction in vulnerability to the submarine menace. The plan's logistic disadvantages soon became apparent. Sufficient stocks of supplies were not on hand in the United Kingdom to mount completely the American portion of the force. The supplies that were available were not so warehoused as to be fully useful. There were not enough service troops for depot operations in sustained support of North Africa from the United Kingdom. Preference had been given to the shipment of combat troops, construction troops, and anti-aircraft units to England. It was not possible to unload the required supporting supplies from the United States, to segregate and store them, and to outload them for Africa.

Detailed plans for TORCH were late in being developed. The British wanted a concentrated attack in the Mediterranean, whereas we favored a simultaneous assault on the West and North African coasts in order to insure a line of communications independent of the Strait of Gibraltar. The resolution of this difference occupied most of the month of August. The decision was to risk splitting the forces in favor of the more positive supply line. Since time was vital, the Army Service Forces had developed a provisional troop basis and proceeded to equip the troops to be mounted from the United States. In late August, when outline plans finally became available, units that were to be equipped by early September were still being activated. Time and space factors dictated a change in target date from

October first to early November. The execution of plans proceeded along with and sometimes even in advance of the full development of plans.

The receiving capabilities of the North African ports and beaches were found to be adequate for the forces which could be employed. The inability of the Navy to provide escorts for cargo convoys constituted a limitation which required a change in the operational plan. On 27 September 1942 the Army Service Forces presented to the Commanding General, United States Army Forces in the British Isles, two alternatives: reduce the size of the Western Task Force from 167,000 to 100,000 and provide full equipment and reserve supplies for all forces; or, employ the original number of men and reduce the equipment for the United States Task Forces by approximately 50 percent, mainly in general purpose vehicles. Since our mission was conceived to be primarily occupational, the second alternative was accepted.

Troops in the United Kingdom meanwhile were completing their training, receiving their equipment, and moving to ports for embarkation. However, much of the equipment that had been shipped for these units could not be readily located in the British Isles because of the inability properly to identify and, store it, and duplicate shipments from the United States were required. Here again the shortage of service troops for depot operations took its toll. Some items were actually delivered to units after they had boarded transports. It must be recalled that the Theater had only recently been activated, that an extensive program of antiaircraft defense and airbase construction was under way, and that, in spite of the recommendations of the Army Service Forces, an insufficient number of service units experienced in depot operations had been sent to the Theater. On 9 September 1942 a radiogram was received listing items of equipment essential to the units in the assault forces to be mounted from the United Kingdom. A total of 131,000 ship tons of cargo was delivered to the United Kingdom between 16 and 25 October for loading in the assault convoy. In addition, eight fully loaded cargo ships were dispatched from the United States and arrived in the United Kingdom before November to join convoys from the British Isles.

The Army Service Forces also became involved in the loading of the Western Task Force. The Third Army was combat-loaded in the United States at Norfolk and Newport News. It was difficult for members of the Third Army Staff to visualize the complexities of combat-loading and the obstacles encountered by the Technical Services in getting equipment and supplies properly packaged, code-marked, and shipped in time to the Norfolk area. The names of the ships in the expedition were obliterated, and ships were known by code numbers or code names. Each piece of equipment had to be marked with corresponding code names or numbers, together with the code names or numbers of the various sections of the pier to which the supplies were moved. All of this marking work had to be done at depots in the Zone of the Interior. The Staff of the Third Army had not developed advance combat loading plans, and it became necessary for the Staff of the Army Service Forces to assist the Third Army when an absolute deadline had to be made. A valuable lesson was learned when it became generally understood that supplies and equipment must be put aboard ships in accordance with code mark-

ings and a loading plan that insured the unloading of supplies in order of need at the point of destination.

After capturing initial objectives on the North African coast, the British Task Force turned east toward Tunisia. Because of the lack of rail and highway transportation, it quickly outraced its supply support. The rapid build-up of Axis forces in Tunisia and eastern Algeria forced the British to halt, consolidate their supporting supplies, and await reinforcements. Railroads were single track and had little usable rolling stock. The decision to leave vehicles in the United States, based on an assumed occupational role, reacted unfavorably when it became a campaign of movement. In order to expand the line of communications to support the final assault on Tunisia, the Army Service Forces made a rush shipment of 222,000 ship tons of equipment, including over 5,000 vehicles to North Africa. This equipment was assembled, loaded, and dispatched within 21 days in a special convoy of 23 ships.

The North African campaign clearly proved that combat forces depend directly upon the capacity of their lines of communications. Early emphasis upon maximum quantities of combat troops and equipment at the expense of service troops and equipment had been faulty. Only after correcting this fault could the campaign be pressed to its successful conclusion. The campaign was the first major large-scale assault for which the Army Service Forces provided support. From it were derived invaluable lessons and experience. The successful procedures developed were standardized and used in subsequent operations.

Sicilian Campaign

The natural sequel to the eviction of the Axis from Africa was the establishment of bases dominating the life-line to Suez. The Allies decided at Casablanca in January 1943 to occupy Sicily. This decision was made only after considering the effect of this campaign upon others then projected. OVERLORD was still to be the major strategic effort, although sufficient men, matériel, and ships could not be made available for Sicily without deferring the build-up of BOLERO, as well as further restricting the already meager shipments to the Pacific. A further logistic implication of an assault upon Sicily was that, if successful, it would undoubtedly lead to an assault against Italy, an area of great defensive strength where strong Allied forces could be checked by weaker Axis forces. In the pursuit of such a campaign, we might waste men, matériel, and shipping without striking a decisive blow. A continued commitment of resources to the Mediterranean would necessarily detract from the major cross-channel blow of OVERLORD.

With the decision made to undertake the Sicilian campaign, the preparation of plans, both operational and logistic, became a Theater responsibility. The mission of the Army Service Forces was the full support of the plans of the Theater Commander. Several major difficulties were encountered. Theater stock control procedures were in their infancy. The ability of the Theater to re-equip troop being made ready for the campaign was doubtful, therefore emergency requisitions were sent to the United States. The 45th Division was combat-loaded from the United States, because time and the status of preparation of the division did not permit

shipment to the Theater for combat-loading there. The congestion of internal communications in North Africa was such that, although supplies and equipment were available there for the continued support of HUSKY, the Sicilian operation, it was impossible, with the service troops and facilities available to insure this support. The Army Service Forces maintained HUSKY by automatic shipments of supplies from the United States throughout the course of the operation.

Once begun, the campaign progressed rapidly and without serious logistic difficulties. Its spectacular progress, without major losses of matériel, left considerable excess equipment in North Africa and Sicily. This was later used in Italy and Southern France, but it pinned down service units in Africa and was used to advantage only because of strenuous efforts by the Theater.

Italian Campaign

Studies of possible operations in the Mediterranean followed the occupation of Sicily ranged from France to Greece. Allied operations in Yugoslavia, Greece, and the islands of the Eastern Mediterranean would have assisted in some degree the Russian campaigns on the eastern front. Logistically, it would have been possible to mount and support operations with limited objectives in any of these areas. Consideration of port capacities and inland lines of communications indicated that only in southern France could adequate forces be built up for a decisive blow against the Germans from the Mediterranean.

An operation in southern France taken by itself would have been a gamble on our ability to reduce greatly the effectiveness of the German line of communications. The Army Service Forces therefore recommended that all available resources support the build-up for OVERLORD, with southern France as the only subsidiary operation in the Mediterranean.

Studies of civil relief in an Italian campaign indicated that Italy would not be self-supporting at any time during Allied occupation. Considerable shipments of coal, food, clothing, and medical supplies would be needed to prevent unrest and epidemics. The Allies made preparations to assume this logistic responsibility before the invasion.

The probability of a favorable political upheaval, the value of air bases closer to the heart of Germany, the strategic advantage of keeping the initiative in the Mediterranean, and above all the desirability of relieving German pressure on the Russian front dictated the assault on the Italian peninsula. The occupation of the toe of Italy met little opposition, but the defensive strength of the peninsula prevented continued rapid advance. Expansion and exploitation of the beachhead at Salerno was strongly contested, and a war of attrition resulted. The air bases at Foggia and Bari, however, secured as a result of the invasion of Italy, proved of incalculable value. They placed the industrial area of Austria and the oilfields of Rumania within range of our heavy bombers, and provided additional bases for shuttle-bombing in conjunction with bases in the Ukraine. Regensburg, Schweinfurt, and Ploesti, which had cost the Eighth Air Force so heavily, became regular targets for the Fifteenth Air Force.

In the Pacific we advanced by isolating Japanese garrisons and concentrating superior forces at critical points; on the narrow Italian peninsula this was not possible. The disruption of enemy logistic capabilities was not so complete, and limited approaches made impossible the concentration of superior Allied forces. Logistically, the enemy and ourselves were on a par, until bombing had greatly reduced the capability of the Germans to resist further pressure.

As in the case of Sicily, the maintenance of forces in Italy could be more efficiently carried out by direct supply from the United States after the assault had been mounted.

There were not enough troops, equipment, or shipping to accelerate the OVERLORD build-up, supply the minimum needs of the Pacific, and support an overwhelming force in Italy. Because of the limited possibilities of a strategic decision in Italy, some forces were withdrawn for employment in the invasions of France. This strongly influenced the operational capabilities of the Mediterranean theater and resulted in the drawn-out campaign which ended only in May 1945.

European Theater of Operations

The campaign in northern Europe that began with the invasion of Normandy had its logistic beginning immediately after Pearl Harbor, when it was decided to strike first in Europe and to maintain a strategic defense in the Pacific. The water distance from America to Europe was approximately half that to combat areas of the Pacific, so that available shipping would permit a much more rapid build-up of adequate forces for a decisive blow. The United Kingdom provided a ready-made base of operations with modern transport and cargo facilities only a few miles from the enemy. The war-making capacity of the United Kingdom was vital to the Allies and could best be employed against Germany. Furthermore, the build-up of troops would provide an early and effective safeguard against any German invasion of England.

Plans for the build-up in the United Kingdom, Operation BOLERO, included the construction of airfields from which to launch an all-out American bomber offensive beginning in the fall of 1942, a small emergency ground force for employment by September 1942 if necessary, and a force of at least 750,000 troops to participate in a combined cross-channel offensive in the spring of 1943. The air assault was assigned first priority.

Calculations made by the Army Service Forces in the spring of 1942 indicated that the capacities of British ports would have to be materially increased. Investigations further revealed that insufficient British labor was available for constructing necessary airfields and housing and for handling supplies. The BOLERO troop basis of 750,000 prepared in May 1942 indicated a requirement of 175,000 service troops. Cargo lift available for June, July, and August totaled more than four million measurement tons. Although this was within the capacity of British ports, it far exceeded the capacity of the United States service troops in the United Kingdom to receive, segregate, and warehouse. Since it was obvious that cargo-shipping capacity would be the ultimate bottleneck in BOLERO, it was decided to

store the supplies in British or makeshift United States depots pending the arrival of adequate service troops.

In May 1942, the Services of Supply, European Theater of Operations, was organized in the United Kingdom. By the end of July, the movement of troops was in full swing. This new command, handicapped by shortages of service troops, was organizing the construction forces and building the first of the tremendous system of airfields which was to blanket East Anglia and to a lesser degree, other areas of England and North Ireland. Gradually depots were developed and American transportation service was integrated with the British system, but the few service units were fighting a losing battle against the mounting piles of supplies and equipment.

The North African operation threw an even heavier burden upon the Services of Supply, ETO. Service units urgently required to handle supplies and construction units for building airfields in the Mediterranean area were sent to the new theater. The cross-channel invasion was postponed until 1944 in favor of TORCH, but the air assault upon Fortress Europe was never relaxed.

By May 1943 service troops in the United Kingdom totaled 37,500, and 90,500 troops had been moved in for the Eighth Air Force. Meanwhile, planning for the invasion of the continent proceeded. American forces in the British Isles were arriving slowly as a result of the large diversions to the Mediterranean and the shortage of all types of ready units in the United States. The prospect for an increase in the rate of movement was not promising until the late fall of 1943, when troops would become available both in the United States and North Africa, and the minimum commitments to the Pacific would have been met. Until the spring of 1943, it was customary to ship troops and equipment simultaneously. The port capacity of the United Kingdom would not be utilized completely, because of the small shipments of troops during the summer and early fall. If the practice of simultaneous shipment of troops and equipment continued, the ports of Britain would be unable to discharge all cargo when the tremendous influx of troops began in the late fall. Consequently, the Army Service Forces initiated the practice known as "preshipment." Organizational equipment was shipped in bulk in advance of the troops on a predetermined troop basis.

By utilizing the preshipment system from May 1943 to May 1944, the capacity of British points absorbed the full load. The preshipment procedure was the only method capable of overcoming the bottleneck of port-clearance capacity. A total of 5,530,000 measurement tons of supplies and equipment were shipped in advance of troop units from the United States to the United Kingdom during the year preceding the invasion. One million six hundred thousand men were moved into the United Kingdom during the same period.

The special Combined Staff in London had primary responsibility for OVERLORD planning. Simultaneous studies on the broader strategic aspects of OVERLORD in conjunction with those of other operations were carried on continuously in Washington. Although the effective range of fighter support from the British Isles limited the number of possible assault areas, all areas were studied for possible follow-up or contingent operations.

Studies prepared by the Army Service Forces showed that special measures would have to be employed in order to provide adequate port and beach capacities

in the selected target area. The assault and follow-up forces were initially estimated at five divisions simultaneously afloat in landing craft, plus two follow-up divisions and two airborne divisions, with a subsequent build-up to at least 20 divisions. The movement of even the minimum tonnage of supplies and equipment for the assault force across the beach was a task that previously had been considered impossible. A plan for two artificial harbors was conceived in London as a practical means of developing the required beach capacities. One of these harbors was destroyed by storms and was of little value in the operation. However, the use of amphibious trucks and cargo-handling equipment on the beaches, the splendid organization of operations on the beaches themselves, the beach clearance facilities, and the superbly trained and led service troops yielded results far beyond expectations, and made success possible in the selected target area. The Germans had concluded that the support of forces through this area was impossible, and as a result were out of position at the time of the assault.

The original plan called for the prompt seizure of western French ports in order to provide the required port capacity. The tactical success achieved after the St. Lo breakthrough prompted a departure from this plan in favor of a pursuit which might quickly destroy the German armies in France. This logistic gamble almost succeeded. However, the line of communications stretched beyond its capacity and halted the Allied forces. The capture of the port of Antwerp and its rapid rehabilitation made possible the accumulation of supplies and equipment for the advance across the Rhine and the complete defeat of Germany.

Because of the U-boat menace, the Theater had originally planned to support Continental operations entirely from the United Kingdom until submarine bases could be neutralized by land assault. The success of the antisubmarine campaign in 1943, however, permitted a change of plan. Computations made by the Army Service Forces in the winter of 1943–44 indicated that requirements for landing our troops and supplies over the beaches would saturate the capacity of the ports of the United Kingdom and exceed the capabilities of available service troops. Plans were made, therefore, to provide for the direct shipment of supplies and equipment front the United States to the French coast beginning D-day plus 15. At the request of the Theater, the New York Port of Embarkation worked out a plan for "commodity loaded" ships that primarily carried one class of supplies. During the period between 6 June and 30 September 1944, 1,050,000 long tons of supplies and equipment were shipped directly to France from the United States. During the same period, 1,680,000 long tons were transshipped from the United Kingdom to France for American forces, and 501,000 long tons from the Mediterranean. The bad weather in the fall of 1944 hampered beach operations, and tenacious German defense of the port areas seriously affected the build-up in France of reserve supplies and equipment. This forced the Theater to utilize the specially loaded ships from the United States as floating warehouses and to call forward only the supplies most vitally needed in support of the operations. Until the port of Antwerp was finally captured, the Theater retained a large pool of shipping in European waters. This floating reserve amounted to 244 ships in October 1944.

The Commanding General, ASF, presented a plan at the Teheran Conference in December 1943 that was adopted as a subsidiary operation in support of the cross-channel assault. This was one of the many studies of alternative or subsidiary operations in Europe prepared by the Army Service Forces. This study, developed in the spring of 1943, proposed operations in the south of France involving an assault force of five divisions, one of them airborne and one armored, mounted from North Africa and Italy. Beach and port capacities were considered adequate for this force in establishing a bridgehead. Computation of port development capabilities and the line of communications indicated at the maximum, capacity for a force of two million men by D plus 365 days. The plan envisaged the use of ports from Sete to Toulon. The study concluded that such an operation could be mounted and supported with available bases and shipping, provided that the efficiency of the enemy line of communications could be reduced by 60 to 75 percent.

This highly successful assault on southern France followed the Normandy landings by approximately two months. The rapid progress of our forces up the Rhone Valley contributed materially to the speedy clearing of the German armies from western France. Furthermore, it contributed greatly to the solution of the difficult logistic problem in northern France. The opening of the ports of Marseille and Toulon relieved some pressure on the Channel ports and beaches during the critical period just prior to the opening of Antwerp, also making possible the reequipping of the French Army and the provision of essential civilian-relief supplies. Throughout the winter, the Rhone Valley line of communications reduced railway congestion in western and northern France and the Low Countries.

Economic and political studies of the occupation of Europe were initiated in the fall of 1942 in order to determine the availability of local resources and the probable demands upon the United Nations for shipping, food, fuel, and textiles in case of sudden German collapse. The scope of these studies varied from the occupation of France to the occupation of all Europe as far as the Vistula. The reports proposed a number of occupational zones for Germany to the Joint Logistics Committee of the Joint Chiefs of Staff. They developed the advantages and disadvantages of each and the lines of communications required to support them. They indicated that support of United States occupational forces through France and Belgium would overtax communication networks. The Army Service Forces therefore recommended that the United States reserve the ports of Bremen and Bremerhaven, and that rail access through the British zone be provided. This was the action subsequently taken.

Persian Gulf Command

The Red Army in 1942 was in very dire straits. It had been pushed back to the gates of Leningrad and Moscow. Tula and Stalingrad were all but surrounded, and the Crimea had been overrun by the Germans. The Russians had lost a major portion of their industrial capacity and production in their newly established factories in the Urals and in eastern Siberia was not yet under way. They needed equipment and they needed raw materials. Tanks, airplanes, small arms and cannon, gasoline,

aluminum and steel, machine tools, clothing, and foodstuffs were required in tremendous quantities. A trickle of supplies and equipment was moving over the northern convoy route at heavy cost in lives and ships. To swell this trickle to a flood, it was necessary to establish the long and difficult supply line through the Persian Corridor.

The United States Army started the establishment of a full-fledged supply route in the Persian Corridor in September 1942. The mission of the Persian Gulf Command was the movement of supplies and equipment from deep-water ports in the Persian Gulf to Soviet transfer points in northern Iran. American troops moving into Iran in the fall of 1942 took over the operation of the Iranian State Railway and the existing truck assembly and port facilities. They constructed docks and warehouses, and plane and truck assembly plants. They built highways and organized a motor-transport service. They put Diesel locomotives and modern rolling stock on the railroad and assembled trucks and planes on a production line basis. They unloaded ships with the temperature at 120° in Khorramshahr, and moved supplies through mountain passes where the temperature was 18° below zero.

American troops, totaling up to 29,500, were supplemented by employing as many as 44,000 local laborers. The greatest monthly movement of supplies to Russia through the Persian Corridor was attained in July 1944, when 289,000 long tons were delivered to the Soviet. Of this total, 171,000 tons were moved by rail, 98,000 tons by truck, 1,170 tons by air, and 17,600 tons by the United Kingdom Commercial Corporation, a quasi-official British company. During the entire period of active operations, commencing in late December 1942 and terminating in the mid-summer of 1945, a total of 5,560,000 long tons of Lend-lease cargo was moved through the Persian Corridor to Russia. These supplies played a vital part in the Russian offensives that culminated in the capture of Berlin.

China, Burma, India

Japanese strategy from 1932 onward was aimed at denying the Chinese armies the support of the industrial areas, first of Manchuria and later of China itself, and at cutting off Chinese agricultural resources. The latter was accomplished either by outright seizure of the major agricultural areas or by periodic forays in strength for the purpose of seizing and destroying the harvests.

After the Japanese closed the south China ports in December 1941 and January 1942, the Chinese armies were denied aid from America except by way of the Burma Road. Although this road never delivered more than 18,000 short tons of supplies per month, the psychological effect of its operation was of vital importance to the Chinese war effort. In March 1942, the Japanese capture of Rangoon blocked this route.

The loss of the south China ports confined the Chinese armies to the waging of guerrilla warfare because of the lack of military supplies. The closing of the Burma Road shut off even its trickle of support. The large, poorly trained and equipped Chinese forces, nevertheless, were forcing the Japanese to keep large ground forces in China.

A primary objective of United Nations strategy was to keep China actively in the war. Implementation of this strategy was a matter of logistics. No line of communications by way of the China ports was possible without control of the South China Sea. Reopening the old Burma Road would have required a major campaign in Burma. Liberation of south Burma and Malaya would have required large amphibious operations for which troops, landing craft, and other equipment could not be spared from other operations, and at best would have provided only an indirect source of aid to China. Limited resources in Asia in 1942 prevented the mounting of a major campaign against the Japanese. The Combined Chiefs of Staff decided to give first priority to the provision of direct aid to China through the use of all available resources in north Burma.

Supplies and equipment could be delivered to China at that time only by air over the Himalayas (the "Hump"). Air delivery of heavy construction equipment, machinery, and heavy organizational equipment to Chinese troops was impossible, hence the opening of an overload line of communications was imperative. The Japanese held all of north Burma. The terrain from Ledo in Assam to the old Burma Road at Wanting on the Burma-China border, a point within the offensive capabilities of the Chinese forces, is an almost trackless waste of mountains, canyons, and broad, swampy valleys. The Himalayas are probably the wildest and most rugged mountains in the world, and the Assam-Burma foothills are covered with dense and steaming jungles. This locality is recognized as one of the most pestilential regions in the world, with malaria, dysentery, and typhus predominating. During the monsoon season the rainfall ranges from 150 to 175 inches, with as much as 14 inches falling in 24 hours. In addition to the natural obstacles, it was necessary to drive the Japanese from the trace of the road as construction proceeded. To many, the difficulties appeared insuperable. The land route was vital, however, to the Chinese.

Simultaneously with the construction of the Ledo Road it was necessary to expand the long and unsatisfactory line of communications from Calcutta which served the Assam area. The latter consisted of the Bengal-Assam Railroad, which was operated by the Indian Civil Service, and the Brahmaputra barge line, which was operated by a number of independent British commercial companies. Construction of the airfields in upper Assam and operations over the Himalayas were requiring heavy tonnages of supplies and equipment. In addition, considerable quantities of supplies and equipment were used to maintain and operate the Ramgarh Training Center in Assam, whose function it was to train and equip Chinese forces for use in securing the land route from Ledo to Kunming. Throughout 1942 and 1943 the China-Burma-India Theater devoted its efforts to expanding the port of Calcutta, accelerating the operation of the Bengal-Assam Railway by providing operational and maintenance personnel, building airfields in Assam, laying pipe lines from Calcutta and Chittagong to Upper Assam, and constructing the Ledo Road and its paralleling pipe lines.

Progress in north Burma depended upon the rate of construction of the Ledo Road, because the road was essential for the support of combat troops. Lack of railroads and highways during this entire period limited other land operations in

Burma to raids by specially trained commando and long-range penetration groups supported almost entirely by air. These units harassed Japanese forces in Burma and prevented their mounting an offensive against Bengal.

The desperate plight of the Chinese Army in the fall of 1943 prompted an urgent request at the Cairo Conference that United States forces be sent to China in order to bolster the morale of the people and to assist Chinese combat forces. It was evident, however, that the support of sizable ground forces over the Burma line of communications would be entirely impracticable. Amphibious operations against the south China coast would require even greater resources than those that had been required for the North African operation. Such a commitment was out of the question in view of the impending assault on Europe.

After the Japanese had been pushed out of north Burma and the road and pipe lines extended to Mogaung and Myitkyina, a strong thrust to the south was made by Chinese and American troops which threw the Japanese off balance and facilitated the movement of the main Allied force from southeast India into Burma. After Chinese troops trained at Ramgarh drove the Japanese from southwest China and northern Burma, the land line of communications into southwest China progressed rapidly, culminating in the opening of the Stilwell Road (the combined Ledo and Burma Roads) in January 1945 and the completion of the pipe line to Kunming on 7 July 1945. The support that the road and pipe lines provided for an intermediate air transport refueling base was particularly important. Without this base, no large increase in air lift over the Himalayas would have been possible.

Although substantial tonnage was being flown into China, extensive operations would not be possible without the land line by which large quantities of wheeled vehicles, and other heavy material not transportable by air, were delivered. Such a line would open the possibility of large-scale offensive operations against the Japanese. The American Theater Commander, jointly with the Chinese, prepared a plan for a Chinese offensive with American air support to open the ports of Canton and Hongkong. But the importance of increasing the flow of supplies by way of the Stilwell Road and pipe lines had to be balanced against the importance of immediately employing the available resources of men and equipment to support an early Chinese offensive designed to capture the Canton-Knowlton port area. The Combined Chiefs of Staff decided that the advantage of such an offensive would be minimized if it were delayed by work designed to increase the capacity of the road, so the latter was deferred. The end of the war found the Chinese ready to strike toward the south coast.

Aleutians Campaign

At the Casablanca Conference in January 1943 it was decided that it was imperative to drive the Japanese from the bases they had seized in the Aleutian Islands. The campaign to accomplish this was planned and executed by the Western Defense Command. The scope of the operations was limited to that which could be supported by resources available to the Western Defense Command and the Alaskan Department, augmented by special some special items provided by the

Army Service Forces. Shortages of service units rendered the support of this operation difficult. However, the logistic implications were comparatively minor, because the forces involved were small.

The Aleutians campaign provided logistic information concerning operations in cold and arctic climates which was subsequently used in determining the feasibility of and estimating requirements for similar operations. The campaign added emphasis to lessons then being learned in the Pacific: Amphibious operations, regardless of size, cannot succeed without trained and adequate service organizations.

Early Pacific Campaigns

The decision to undertake a strategic defense in the Pacific committed us to a program of developing bases from which to launch our eventual counteroffensive. First, however, it was necessary to halt the Japanese conquest and to secure the few major-base areas remaining. We needed time in which to defeat the European Axis, time in which to rebuild the fleet, time in which to train men, and time in which to manufacture supplies and equipment. The heroic defense of the Philippines gave us a few precious months in which to move forces to Australia, New Zealand, New Caledonia, and the New Hebrides. The battles of the Coral Sea in May and Midway in June 1942 checked the Japanese advance. From then on the war in the Pacific became a series of operations for the successive seizure of areas that were to be developed for air cover and the logistic support of subsequent advances. The objective of the 1942 campaign in New Guinea was to shorten supply lines by establishing major bases along the New Guinea coast for the support of future operations. The primary objective of the assault on Guadalcanal was to seize a forward air base in order to cover further operations from the South Pacific.

Because of the distances in the Pacific, tremendous quantities of shipping were required for relatively small forces. The shortage of shipping and of service troops came perilously close to costing us the Guadalcanal victory. The campaign across the Owen-Stanley mountain range to Buna Mission was painfully slow. The work of the Army Service Forces in support of these campaigns involved a careful weighing of the requirements of the North African campaign and BOLERO against the critical requirements of the Central, South, and Southwest Pacific Theaters.

During 1942 the bulk of available shipping was utilized in the Atlantic. Only minimum requirements were allotted for the occupation and build-up of Pacific bases. Difficulties arising from the shortage of shipping in the Pacific were aggravated by difficulties in the assignment of shipping priorities between the Army and Navy and by a lack of coordination in the development of bases in the Pacific areas. Critically needed shipping was tied up for long periods in oversea ports, particularly Noumea, Caledonia, while the inadequate cargo-handling facilities were occupied with shuttling vessels for piecemeal unloading. It was necessary to dock vessels, search them for urgently needed items, and then replace them with other ships for the same type of selective unloading, in order to make available even the

minimum essentials. The Director of Operations of the Army Service Forces went to the Pacific for the purpose of investigating this problem. His recommendations resulted in the establishment of a Joint Logistic Staff and phased shipping to the South Pacific Theater. This scheme was adopted later in the Pacific Ocean Areas.

The Joint Logistics Board formed by the commander of the South Pacific was a local agency operating under the area command. It established shipping priorities and priorities in the use of local facilities. It was successful in that no further major difficulties of this sort developed during its existence. The Joint Staff for the Pacific Ocean Areas, which was organized approximately a year later, absorbed the South Pacific Joint Board and functioned for the entire Pacific. This staff was superimposed upon Army and Navy staffs already in existence. It exercised control over all shipping in the Pacific Ocean Areas and prepared or reviewed logistic plans. Since the various base commands retained their direct channels to the Ports of Embarkation, however, the potentialities of the Joint Staff were never fully realized. Separate channels for routine supply requisitions for Army and Navy continued to be used. Duplication of requirements and dual standards of living, which might well have been eliminated by this Joint Staff, continued in varying degrees throughout the war.

In the summer of 1942 the Army Service Forces made long-range estimates for the production of critical items for the Pacific campaigns. For example, the vital communications plan for the Southwest Pacific was the first for which procurement was made. The plan provided for a complete communications network from Australia and the Solomons through New Guinea, Borneo, and the Philippines. Developed by the Signal Corps, it was an outstanding achievement in procurement planning.

The build-up of supplies in New Caledonia, Espiritu Santo, and Guadalcanal, took more than a year. Not until June 1943 could the South Pacific Theater mount further assaults in the Solomons. Landings on New Georgia in June were followed by the seizure of Vella Lavella and Treasury Islands and the establishment of the Bougainville beachhead. The Theater developed these areas as air bases for an eventual assault on Rabaul and further operations on Bougainville. As operations progressed in the southeastern New Guinea area, bases were developed in Milne Bay and Finschafen, and heavy concentrations of supplies were built up.

Operations in the Southwest Pacific were characterized by swift shore-to-shore amphibious operations designed to bypass pockets of resistance and establish forward bases from which further "end runs" could be mounted. Such operations were dependent for their success upon immediate logistic support and the rapid build-up of supplies and equipment in the new areas. Almost without exception these areas were trackless jungles, and all facilities, including roads, trails, and airfields, had to be constructed. An Engineer Amphibian Brigade, organized and trained by the Army Services Forces, operated some of the landing craft for these shore-to-shore operations, moved supplies and equipment for the combat elements and the construction forces, and established supply installations concurrently with the clearing of the beaches. These highly trained and specialized units made the type of operations required in the Southwest Pacific possible.

By the summer of 1943 the development of base facilities in Hawaii and the ship-construction program had progressed to the point where the Joint Chiefs of Staff could consider the mounting of a major offensive in the Central Pacific. In July 1943 the Navy and the Army Service Forces collaborated in preparing a joint logistic plan for operations against the Gilberts and Marshalls. Specific assignments of logistic responsibility were worked out. The plan was presented by the Joint Chiefs of Staff, and accepted, at the Quebec conference. Conferences with representatives of the Theater followed, and the required supplementary supplies and equipment were concentrated along the west coast of the United States. The need to load the task force from Oahu, Hawaii, together with the usual shortage of service troops, required the direct movement of maintenance supplies and equipment from the United States.

Meanwhile studies of future operations against Truk, the Palaus, and the Marianas were progressing. Each area was studied in detail for the purpose of determining the requirements for assault, consolidation, airfield construction, and base development. Accelerated ship construction and the stabilizing of campaigns in the Mediterranean to some extent relieved the critical Pacific shipping situation.

Although service units were still a major shortage, certain combat units, notably the First Cavalry Division, became available to the Southwest Pacific Theater. New Britain and New Ireland were bypassed, and the Admiralties were occupied. This maneuver made Rabaul useless to the Japanese and gave the Navy a major base at Manus in the Western Pacific.

The Japanese garrisons in the bypassed areas, cut off by our submarine, surface, and air blockade, rapidly lost their potentialities as combat forces. With their air forces eliminated, they ceased to threaten our line of communications. Without supplies and reinforcements, they withered on the vine and became a liability to the Japanese.

The improved shipping position and our base in the Admiralties permitted the Navy to bypass Truk and Ponape and to attack the Marianas in June 1944. There service troops constructed air bases for the B–29's that later attacked Japan. In September our forces bypassed Halmahera and seized the Palaus and Morotai. These moves provided the air bases used in completing the preliminary phases of the Pacific campaign.

The Philippines

Logistic studies of the Philippine area were begun in 1942 by the Army Service Forces, looking toward the conversion of the islands into bases for operations against Japan or the China coast. Early plans called for the development of Mindanao as a staging area and air base for the seizure of Luzon, which in turn would be the base for operations against China, Formosa, and the Japanese home islands. These studies furnished the basis for procurement, priorities, and distribution plans.

In May 1944 the Joint Strategic Survey Committee suggested that an operation against Formosa, rather than the Philippines, might hasten victory. There

were not enough service troops to permit operations against Formosa and Luzon simultaneously. The Army Service Forces reviewed the two plans and concluded that Luzon was the better target. The ports of Formosa were limited in capacity and were susceptible of easy blocking. Larger airfield capacity and a better road network were available on Luzon. The greater land mass of Luzon provided opportunity for fuller use of available assault shipping. The island's occupation could be covered by land-based aircraft. Labor and material were more abundant on Luzon. The Joint Chiefs of Staff withheld decision pending an analysis by the Joint Logistics Committee of the availability of resources and other logistic factors. Representatives of the Army Service Forces contributed largely to this study. The Joint Chiefs of Staff in October 1944 directed the seizure and occupation of Luzon.

The offensive power of the Navy and the Air Forces made the reoccupation of the Philippines possible. Operating from forward bases captured from the Japanese and, in the case of the Navy, from tremendous trains of auxiliary ships, the two arms destroyed the Japanese air forces, and restricted the movements of Japanese troops and denied them reinforcements and supplies.

Logistically, the Philippine campaign presented no new problems. The Leyte operation was a part the opportunistic diversion of a task force en route to Yap. The assault at Lingayen Gulf was a normal ship-to-shore amphibious operation. Except for special attacks on fortified islands, operations employing the Engineer Amphibian Brigade were the type used along the coast of New Guinea.

The securing of Pacific supply lines and the success of the cargo-ship construction program made possible direct shipment from the Zone of the Interior, hence the vast quantities of supplies stored in New Guinea became less vital to operations. Sufficient service troops were not generally available for loading from one set of bases simultaneously with the establishment of new forward bases. As a result of these two factors, the rear-base stockpiles were reduced slowly, and weather and storage conditions prevailing in the tropics caused excessive wastage.

In the development of the Philippine base, the provision of sufficient service troops was again a major logistic problem. Theater plans and those of the Army Service Forces had borne fruit in a flood of supplies and equipment. Japanese devastation imposed heavy demands upon construction troops. The civilian population was destitute. These latter two factors increased the already heavy demands for service troops to receive, unload, and distribute supplies; to construct depots, ports, and airfields; and to maintain the combat forces that were mopping up the Archipelago. Additional service troops could only be obtained by redeploying them from Europe.

Port capacity in the Philippines depended on the service troops' ability to clear the docks of incoming-cargo shipments. Meanwhile, it was necessary to make plans for the outloading of the forces to be used against Kyushu and Honshu, because service troops from Europe would arrive too late to take part in this phase of projected operations. Relying upon redeployed units in the target areas, therefore, all available units had to be used for base development.

Preparation for the Final Assault on Japan

In the fall of 1944 the war was progressing rapidly, and it was apparent that the invasion of the main islands of Japan could be accomplished. The invasion of Luzon had been planned for the end of the year. The use of the Philippines as a base for continued operations was definitely planned, although the extent of their development for this purpose was not yet decided. The Joint Chiefs of Staff had directed that operations against Iwo Jima and the Ryukyu be undertaken in the spring of 1945. The war in China continued to be subordinated. The war in Europe had not yet ended, although every effort was being made to end the European phase as rapidly as possible. The war in the Pacific had to continue, for the moment, with shortages of both equipment and troops.

All supplies and equipment possible, however, were made ready for the final effort against the home islands of Japan. The War Department General Staff and the Joint Chiefs of Staff indicated the probable course of operations against Japan. Definite details of the final operations were not available at this time, although tentative dates had been established for planning purposes.

To assure supplies and equipment for the duration of the war, whether on a one-front or a two-front basis, the Army Service Forces coordinated the procurement planning of the Technical Services on a long-range basis. To this end, in December 1944 the Army Service Forces prepared logistic studies for the prospective operations against Kyushu and Honshu. These contained target dates; troop bases showing major units, phasing of troops, and supplies; supply levels; and proposed construction projects. Procurement was adjusted on the basis of these studies early in 1945. The studies and projects were then forwarded to the War Department General Staff and to the Theater. Theater planning for the operation against Kyushu had progressed to such a point that the Army Service Forces plans could not be used intact by the Theater in their determination of requirements. However, the two plans, Theater and Army Service Forces, compared favorably, and only minor changes in procurement were necessary.

The Theater used the Army Service Forces' logistic plans for the operation against Honshu as a guide in their planning for that operation. Logistic factors determined the choice of target dates and the size of forces. The target dates depended on the ability to deploy supplies, equipment, and troops and to construct the necessary bases. Assault shipping, availability of troops from the United States or Europe prior to the operations, and the capacity of landing areas supporting the forces ashore limited the size of forces. The logistic preparations for supporting assault operations against Japan, including plans for the tailored packing and loading of 482 ships for the Kyushu operation and some 700 for Honshu, were well under way when hostilities came to an end, and 135 of the specially-loaded vessels were used to support the occupational forces.

Redeployment

Redeployment was a clear-cut example of the influence of logistics upon grand strategy in the Pacific. Operations had been limited to those areas where an

initial superiority of forces could be achieved and maintained. The transfer of men and matériel from Europe made possible the concentration of forces necessary for the support of an invasion of Japan proper.

Planning for the continuation of operations in the Pacific after the capture of the Philippines was based upon the time required for redeploying from Europe the additional service troops and supplies necessary for the construction of bases in the Pacific and for the equipping of assault forces. Redeployment involved the moving of 1.2 million men from Europe, 400,000 directly and 800,000 by way of the United States. It also involved moving five million tons of equipment and supplies from Europe directly to the Pacific, and returning five million tons to the United States. This operation proved to be the most difficult that had confronted the logistic organizations in Europe, the Pacific, and the United States. The service organization in Europe had been designed for the receipt of supplies and their processing and delivery to consumers at the front. The end of hostilities and redeployment to the Pacific necessitated a complete reversal of the process. The service troops needed in Europe for preparing shipments were the same troops required in the Pacific for receiving, warehousing, and issuing matériel on a scale never before reached in that area. The previous operations in the Pacific were minor compared to the final assault envisaged against Japan. The construction of major bases, adequate for the support of more than a million men in combat, were now required in the Pacific.

Vast distances were involved in the transfer of men and supplies from Europe to the Pacific, either directly or by way of the United States. Service forces in the European theater had to be trained in the methods of screening requisitions, packaging, documentation, and shipment, because their previous experience had been confined to the receipt of matériel. The time consumed in shipping supplies from Europe was so great that the service organizations in the United States and the Pacific had to advance their target dates by several months. The task of coordinating movements, of training key personnel and staffs in Europe for the task of outshipping, of accepting supplies returned to the United States, and of repairing, warehousing, and re-issuing them fell to the Army Service Forces. Redeployment was a triangular operation, whereas earlier operations had involved the direct flow of supplies. The final assault against Japan was dependent for its success upon the orderly flow of men and supplies from both the United States and Europe. Only if redeployment were on schedule would operations take place on schedule. The war came to an end before the redeployment operation could be fully tested.

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The Logistical Bottleneck in Northwest Europe

Introduction. Col. William Whipple, the chief logistical planner at SHAEF in World War II, provides an excellent overview of the planning and execution of logistical support for the Allied campaign in Northwest Europe after D-Day, with particular emphasis on the critical period from September through November 1944.

Much interest attaches to certain major decisions and conditions in Europe in the fall of 1944, particularly the lack of support for further operations of General Patton's victorious Third Army. There was considerable acrimonious debate at the time and argument still goes on.[1] The actual limiting conditions were of a somewhat technical nature and are still not generally understood.

The fact is that in September 1944 British 21st Army Group, U.S. Third Army, U.S. First Army, U.S. Seventh Army, and French First Army, too, all thought their operations were inadequately supported, particularly as regards supply. Both 21st Army Group and Third Army felt strongly that if they received full priority in use of available resources, they could end the war in a very short time.

At the time, and later on, the highly exasperating situation in which we could not continue our full pursuit of the shaken German Army has been variously blamed on Communications Zone, on SHAEF, on "high level politics," on undue favoritism to the British, an the excessive strain on transport caused by Third Army's advanced position (a British view), on shortage of gasoline, on alleged preoccupation of service troops with black market activities and luxurious living, and still other more or less plausible causes. Certainly it was not to be expected that the reactions of victorious combat commanders, held up for lack of supplies, would be calm and objective. Indeed, apprehension of their healthy and uninhabited reactions was a strong incentive to responsible administrative staffs.

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There were strong differences of opinion at the time among responsible staff officers regarding certain problems. There is plenty of ground for discussion as to how certain difficulties could have been avoided. It is true, however, that some of the later criticism has been based on ideas that were fully stated and fully considered by the proper staffs and then rejected, sometimes long in advance of the event. And not arbitrarily rejected, but simply through actual necessity proven by the basic arithmetic of logistics. The very serious operational consequences that these logistical difficulties brought about makes it important to understand just what the problem was and how it arose.

During the first three months after the Normandy landings extensive operations had been conducted without serious logistical troubles by virtue of effective and detailed advance planning over the preceding eighteen months. Again, after December 1944, all serious difficulties were overcome. But during the critical period of September–November 1944, all strategical or tactical decisions of importance were governed by the precarious situation of transport and supply. This article outlines some of the most awkward and inflexible of the difficulties and their effect upon the strategy of the campaign, as seen by the Allied Planning Staff.

Organization of the Allied Expeditionary Force

Both Allied and U.S. organization of the Allied Expeditionary Force was unorthodox during the initial phases, the OVERLORD period. The Ground, Air and Naval Commanders in Chief had wide authority delegated to them. They functioned jointly and directly under the Supreme Commander, whose staff was not at the time operational, but was acting primarily in a planning capacity. The seizure of the lodgment area under the joint Commanders in Chief, which ended the OVERLORD period, was effected late in August, and SHAEF then became operational. This new organizational stage was reached at a moment when the Allied forces were engaged in headlong pursuit.

After the formal inclusion of forces from the Mediterranean in mid-September, the whole force consisted of three U.S. armies and one French army, grouped under two U.S. army groups; one British and one Canadian army plus British line of communications troops, under a British army group; two U.S. communications zones; three tactical and two strategic air forces; and naval forces. The two U.S. communications zones, in accordance with orthodox U.S. doctrine, were responsible to the theater commander rather than to army group. This was necessary since the two communications zones were later to be combined.

As to major logistical questions, the U.S. elements of the SHAEF staff were responsible for theater-level coordination of communications zone operation and army group requirements. SHAEF also exercised a more general control on an Allied basis over British as well as U.S. forces.

Strategic Planning for Post-OVERLORD Operations

The SHAEF staff was not responsible for the original OVERLORD plans, except insofar as certain members of that staff had been members of earlier planning

groups. Operations under these plans were mainly the responsibility of the three Commanders in Chief, acting jointly. The lodgment area, the objective of the OVERLORD operations, was considered achieved when our forces reached the line of the Seine River; and the SHAEF Planning Staff had devoted much thought before D-Day to operations after the OVERLORD phase for which SHAEF would be responsible.

The initiation and coordination of SHAEF strategical planning were effected through the Planning Staff. All Planning Staff papers and actions required anticipation by Operations, Air, Naval and Logistical Head Planners, and usually Intelligence. Each Head Planner was responsible for straightening out and adjusting any conflicting national points of view, as well as for technically sound contributions to the plan, so that the finished paper could be cleared by higher staff officers and given final approval. If any one of the participants in a Planning Staff meeting objected to the action taken, he would present his objections through his own channels after the meeting and attempt to obtain his point at a higher level, but this, it should be recorded was not often necessary. On the more complex problems, the Planning Staff always called for assistance of staff specialists. Initially, the Planning Staff handled mainly long-range planning rather than day-to-day matters, though later in the campaign it did consider many problems of immediate concern.

It was believed that the capture of either the Ruhr or Berlin would insure a German surrender, but that occupation of lesser objectives such as the Saar, or the cities of South Germany, would not necessarily do so. To reach the main objective, it was planned to move generally up the coast, which would have the further advantage of obtaining the great ports of the Low Countries as bases. In particular, the entire Ruhr lies within about 150 miles of the port of Antwerp, which has very extensive port facilities.

There were, of course, other considerations, including the desirability (not much talked about) of overrunning the V-weapon launching sites which had not yet been employed. It was evident also that there were unspoken political considerations on the part of the British planners, though the early liberation of the Low Countries was certainly not unwelcome to U.S. policy. Operations extending on both sides of the Ardennes were considered necessary in order to allow space for the large Allied forces to deploy and maneuver. After much study of operational, intelligence and logistical aspects, the Planning Staff worked out approximate anticipated timing and approximate phase lines. These original basic plans, upon approval, formed the groundwork for all detail planning, including communications zone supply plans, for operations after the crossing of the Seine. They were eventually followed quite closely.

There were two major divergences from the progress anticipated. In August and early September the Allied Forces advanced much faster than had been expected. And German resistance in the final stages, after the capture of the Ruhr and Silesia, was more stubborn and prolonged than anyone had anticipated. Otherwise, the forecast of operations was generally accurate. There was one other significant divergence. Although ports were in general overrun earlier than

anticipated, a number of the most important resisted capture for much longer than was expected.

Pre–D-Day Logistical Planning

The term Logistical Planning, as used in the ETO, covered mainly the broad aspects of supply and movement planning, and their coordination with tactical and strategical plans. The most urgent long-range objectives of such planning when initiated in SHAEF were three: (1) to determine the maximum number of divisions and supporting troops that could be moved to the Continent and maintained in combat; (2) to determine the tonnage of supplies required for their support; and (3) to verify that port and beach capacity would equal the tonnage of supplies to be landed. Obviously these results had to balance. The next problem was to determine how fast and far our forces could advance if, as actually happened, we made a break-through.

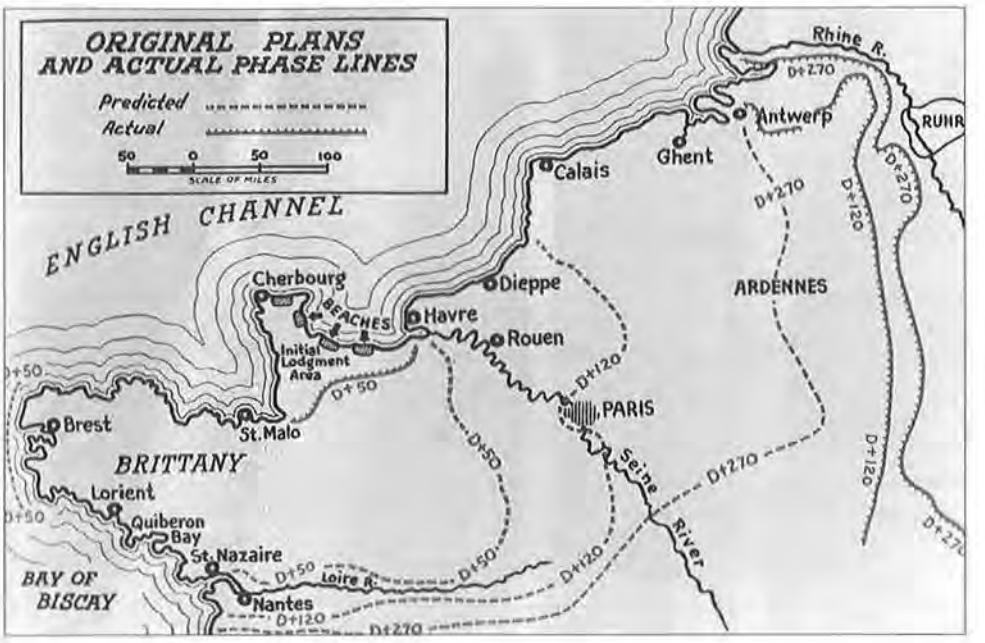
These logistical plans were made by an Allied staff, but were based on keeping U.S. and British lines of communication separate as far as practicable. Different factors were used for U.S. and British potentialities where experience so indicated this to be better. The plans considered only the landings in western France at this time, for the Anvil forces from the Mediterranean were to have entirely separate lines of communication, and stayed under the Mediterranean Theater until much later on.

Some results of this planning, as it concerned U.S. forces, are summarized in Table I which gives the planned U.S. build-up in divisions (each accompanied by 25,000 supporting and service troops), and Table II, which shows the estimated U.S. tonnage requirements (exclusive of bulk p.o.l.) and the port capacity.

TABLE I—PLANNED BUILD-UP OF U.S. DIVISIONS

Date	Planned No. Divisions on Continent (excluding airborne)	Divisions Arriving Preceding Month	Routing of Divisions
1 Sep.	21	3	All staged in U.K.
1 Oct.	27	6	Two staged in U.K. Four direct from U.S. to Continent.
1 Nov.	34	7	One staged in U.K. Five direct from U.S. to Continent.
1 Dec.	39	5	All direct from U.S.

1. This table refers to divisions to be brought in and supplied through Western French and Belgian ports only, and is exclusive of Sixth Army Group.
2. Divisions direct from U.S. in September–October were later scheduled for an increase, but this could not be effected.
3. Build-up shown in this table was a revision from the "OVERLORD" Plan which allowed for "two to four" divisions a month.



The estimated build-up and tonnage requirements proved quite accurate. With particular regard to build-up, an attempt was later made to speed up the planned arrivals of divisions from the U.S. in September and October. But the administrative difficulties proved so great that additional divisions had to be diverted, some to the Mediterranean and some, temporarily, to the United Kingdom. The result of this was that the effective build-up was practically as it had been originally planned. As regards tonnages the original planned figures in Table II still represent a fairly good statement of the actual requirements. It is true that the actual tonnages shipped from the U.S. and U.K. considerably exceeded these figures. But, as will be discussed in detail later, the tonnages landed at the ports during the critical months were much less.

The plan of port development outlined in Table II was the result of close figuring. Nominally, it indicated 5,000 tons of spare port capacity at D plus 60, but this only if all ports were captured on schedule and were repaired on schedule. The estimate that an average of 14,000 tons a day could be put ashore on the bare flat beaches of Normandy, exposed to the Atlantic swell, was only a theoretical forecast, since no such large-scale operation of the kind had ever been conducted. Moreover, it was known definitely that open beach operation would have to cease entirely some time in October because of seasonal storms, although the artificial harbor could continue to function. This bad weather would also affect minor ports to a lesser degree. Cherbourg capacity, it was expected, would increase moderately; but it was not expected that the Seine ports would be captured in time to make up for the lost beach capacity, let alone to provide the 20,000-ton daily additional capacity needed by November 1.

TABLE II—PLANNED TONNAGE REQUIREMENT AND U.S. PORT CAPACITY

Port	Capture Date		Est. Capacity at Aug. 6	Notes
	Estimated	*Actual*		
Beaches	D-Day	D	14,000	Good until end of September.
Cherbourg	D plus 8	D plus 21	7,000	Reliable capacity to be increased to 10,000.
Minor Normandy Ports	D to D plus 17	D to D plus 57	4,400	Decreased at end of September.
St. Malo	D plus 25	D plus 73	2,500	
Brest	D plus 50	D plus 103	3,200	Potentially greater but inaccessible to rail.
Lorient	D plus 50	....	800	
Quiberon	D plus 40	....	4,000	New development. To be increased to 10,000.
Loire Ports			0	Latest intelligence indicated not worth developing.
Seine Ports	D plus 120	D plus 96	0	Anticipate capture about 1 October.
	Total estimated port capacity 6 Aug.			35,900
	Estimated tonnage requirements:		6 Aug.	30,700
			1 Sept.	37,600
			1 Oct.	38,600
			1 Nov.	51,239

To meet the indicated deficiency in the later months, use was planned of the only available expedients. Brest was a good port, but it was expected that it would have its rail communications broken by the demolition of the long rail viaduct at Morlaix, which would be impracticable to repair. Therefore, it could not be counted on as a supply port. However, it was safe to plan its use as a reception and staging area for troops arriving from the U.S. in September and later months. This appeared to be an ideal solution. The arrival each month of five divisions and other troops totaling 200,000 men, the unboxing and assembling of thousands of vehicles, the issuing of all equipment and supplies, and supply and administration while staging, would require a large area and several thousand tons a day of port capacity. The staged units, when ready, could move out on their own vehicles. The anticipated date of capture of Brest was late in July, which would allow time for necessary preparations.

Quiberon Bay was the other unorthodox potential development. This was a large natural harbor with good rail connections, but one not normally used as a port except by fishing vessels. Its development to handle up to 10,000 tons per day was planned by Communications Zone, approved by SHAEF and accepted by the

U.S. War Department, and all necessary equipment was obtained. Piling and other heavy equipment was to be rafted around the Brittany Peninsula during the good summer weather, as soon as Brest and the German submarine base at Lorient were cleared. This plan would have been much simpler and easier to accomplish than the construction of the artificial harbors on the Normandy beaches and it would undoubtedly have been successful.

But the stubborn German defense of Brest and Lorient not only made it impossible to use Quiberon Bay; it denied us the port of Brest itself.

Thus, about the end of August, with our forces driving East across France at full speed, and the British about to start their rush to the North across the Seine, we were faced with the loss of these two projects—with the loss of about 14,000 tons per day of planned capacity needed to replace the supply movements across beaches, which would soon be stopped by the autumn storms. Moreover, the U.S. artificial harbor had been destroyed by a severe storm in June, which did not greatly affect us at the time but meant that its capacity could not be counted on for bad weather. The only remaining hope of avoiding administrative strangulation lay in the prompt opening of the Seine and Belgian ports.

Table III shows the actual cargo discharge through U.S. ports and beaches during the period before Antwerp opened, compared to the SHAEF estimates of requirements. The indicated deficiency in port capacity was 4,000 tons per day in August, rising to 20,000 tons a day in October and November. That this was a real deficiency and not a paper one was shown in two ways. The accumulation of shipping that awaited discharge in European waters rose to 150 ships on September 1 and 240 on October 20. And second, the Armies in September and October received only about two-thirds of the supplies tonnage they required for full-scale operations, even though not all the troops were at the front. It is true that most of the initial shortages were directly due to deficiencies in the inland transportation system. But the slow unloading of rolling stock, engineer supplies and ordnance spare parts at the ports in turn slowed down the transportation system. Lack of port capacity was a bottleneck, in the truest sense of the word. The stubborn German defense of ports in Brittany, which prevented Brest and Quiberon Bay from being developed, cost U.S. forces each day up to 14,000 long tons of supplies, which accumulated offshore in ships that could not be unloaded. Finally the War Department was forced to cancel shipping.

TABLE III—U.S. CARGO DISCHARGE IN PORTS OF WESTERN FRANCE
(Daily average, long tons)

	Cherbourg	Normandy Minor Ports	Brittany	Le Havre	Rouen	Beaches	Total	Original SHAEF Est.	Approx Deficit
July 1944	1,000	1,300				17,700	20,000		0
Aug. 1944	8,500	4,000	300			17,300	30,100	30,700	4,000
Sept. 1944	10,400	3,300	2,500			13,100	29,300	37,627	9,000
Oct. 1944	11,800	1,900	2,500	2,000	900	6,300	25,400	38,600	20,000
Nov. 1944	14,000	1,600	2,100	4,800	4,100	900	27,500	51,239	20,000

From August onward the opening of Antwerp was plainly the one means of meeting an already serious situation, bound to become more acute as soon as the autumn storms shut down the beaches.

Development of Strategy

It was about this time [August 1944] or shortly before when the 12th Army Group plan for a quick drive by Third Army across the Rhine was advocated and carefully investigated. Logistical and movements studies in SHAEF before D-Day had shown that our advancing forces would probably be brought to a halt by lack of transportation not far from the line of the Seine, until rail transportation could be developed. This study had been the basis for a request to Communications Zone to increase the number of truck companies in the troop basis, which was done, as far as such companies were available. It was realized by the advocates of the Twelfth Army Group plan that, in view of the difficult existing situation as regards trucks, rail and pipe lines, a further advance by Third Army to cross the Rhine and advance to the east of it could only be made by sacrificing the mobility of other forces. Truck columns and normal air transport were already strained, but much more could obviously be done for a limited force if four things were done:

(1) If the other armies were held inactive near the ports or their divisions grounded;

(2) If bombers, and planes of airborne troops were used for air transport of supplies;

(3) If Third Army were given priority on all available supplies;

(4) If the British troops were held on the Seine or shortly beyond it.

Advocates of this plan maintained—and this was admitted in G–4 SHAEF—that by these emergency measures Third Army, with not more than ten or twelve divisions, could probably be supported in such an advance across the Rhine, possibly as far as Frankfurt. At the time there appeared to be no German forces that could prevent the advance.

It was further maintained by Twelfth Army Group planners, and this was the crux of the matter, that once the Third Army crossed the Rhine, the Germans would immediately surrender. In view of the ferocious last ditch defense the Germans made the following spring, it hardly seems probable that they would actually have surrendered, but it might possibly have happened. The attempt on Hitler's life had had very disturbing effects on the Reich government and on Hitler personally, and certain members of the German Army were involved. But early surrender did not appear at all probable at the time, and in any event there was no certainty as to what was going on in Germany.

There was nothing in such an advance across the Rhine to materially impair the strength of the Germans or force them to surrender. Frankfurt was the extreme limit of any advance logistically possible to a considerable body of troops, and Frankfurt is not even the principal city of southern Germany. The part of Germany the advance would occupy did not include much of either the governmental, military, or economic potential of Germany. Ten or twelve divisions seems a lot of

troops in peacetime America. But they were only one of six Allied armies at the time and a very small force compared to the still existing German army. The advance would leave a northern flank 150 miles long through German territory, out of which German forces could move at any time to cut the Third Army's line of communications. The Allied Air Forces would have great difficulty in establishing adequate fighter cover so far forward, for time and supplies are needed to build up bases.

However, the most serious and certain consequence of undertaking such an operation, if the Germans did not surrender, would be the abandonment of operations to capture and open the port of Antwerp. Table III shows that without Antwerp U.S. forces would be short 20,000 tons a day of supplies, and this expected shortage was clearly evident in late August. The British had on their landing beach the Mulberry "B" artificial port, which together with Dieppe and some very minor ports might have been barely adequate for their winter needs. Without Antwerp, however, the U.S. forces could not receive, equip and employ in operations the new divisions coming over every month. They would be forced by lack of supply to a static defense with reduced forces, and this on an extended front. There was no possibility whatever, in the minds of the staff, that Allied logistical resources, without Antwerp, could become sufficient to extend the proposed Third Army operations beyond Frankfurt to the Ruhr, or to Berlin, or even to Munich. The only chance of success lay in psychology. Such an advance might have frightened the Germans into surrendering at once. But if it did not work out that way, the operation would have brought the Allied forces to the brink of administrative disaster.

The above is a summary of informal staff reaction at the time; the matter was never brought before the Planning Staff as such. General Eisenhower did not authorize the proposed Third Army drive farther to the east, but instead gave priority to 21st Army Group's two Armies and to First Army to continue their drive north, in order to clear the Channel ports and the V-weapon launching sites, and to open Antwerp. Third Army, deprived of supplies enough for an offensive, was held in place, while Sixth Army Group, with an independent line of supply, but equally low priority, came up on the flank.

Twelfth Army Group was not the only army group that believed Germany could be quickly defeated that fall. Field Marshal Montgomery, commanding 21st Army Group, has recorded that over the period August 23 to September 12, he discussed at length with General Eisenhower the plan of campaign, and attempted unsuccessfully to obtain approval of a plan to immediately concentrate all resources of U.S. and British alike for a single drive north of the Ruhr. This plan involved holding other portions of the line static and forcing a crossing of the Rhine before opening Antwerp. The 21st Army Group was allowed to stage a large airborne operation (Arnhem-Nijmegen), to attempt to seize a bridgehead across the Rhine before German resistance could form, but this was only a limited objective operation. The policy of opening Antwerp before attempting major operations east of the Rhine was maintained. Logistically, any other course seemed likely to gamble away our assurance of ultimate victory for a possible time advantage.

Logistical Stringency

The great drives of early September 1944, which furnished so many fine headlines, brought hectic days and sleepless nights to the Communications Zone staff, haunted by thought of the lengthening lines of communications and inadequate port capacity. On September 7, Third Army reached the Moselle in the Nancy-Metz area. On September 4, 21st Army Group, driving fast from the Seine, liberated the town of Antwerp; but the sea approaches up the Scheldt remained in German hands. British Second Army drove on to attempt their Rhine crossing at Nijmegen and Arnhem on September 17, with the aid of three airborne divisions. On September 13, First Army penetrated the famed Westwall in German territory. On September 11, Seventh Army, advancing up the Rhone Valley from Marseille, gained contact with Third Army and completed the Allied bunt. By October 1, lines of communication bringing supplies from Normandy and Marseille were 400 to 500 miles for U.S. front-line units and 350 to 400 for the British, as shown in Table IV. The basic loads of unit vehicles were largely exhausted. Truck transport was stretched to the breaking point, and railroads, with bridges, yards and shops all-too-well bombed by our air forces, were slow to repair. Stringencies in port unloading limited coal, rolling stock and engineer supplies needed to extend rail communications, since immediate urgencies were reflected in priorities for food, ammunition and p.o.l.

TABLE IV—APPROXIMATE LENGTH OF LINES OF COMMUNICATION
October–December 1944

Army	From Normandy	From LeHavre	From Antwerp
First	500	350–400	125–150
Third	425	....	....
Ninth	500	350–400	125
Second British & First Canadian	350–400	Dieppe 200	125–150
Seventh Army & First French	450–500 miles from Marseilles (Frankfurt 575 from Normandy)		

Favorable Circumstances

There was one major favorable circumstance, without which the situation would have been considerably worse. The great French coal fields of the Valenciennes area, largely demolished by the retreating Germans in World War I, were this time almost untouched. Coal still had to be imported from England but not so much as had been feared. It is not generally realized that the liberation of a great city as well as the operation of a railroad line requires coal. Paris, for example, without any space heating, requires some 7,000 tons of coal per day to keep the subway and necessary utilities going on a minimum scale. This coal had to be supplied or all sorts of consequences would have resulted inimical to our opera-

tions. If coal had not come from the Valenciennes fields, much more would have had to be imported, and other supplies would have had to be further cut down. It is not too much to say that the overrunning of the Valenciennes coal fields intact was by November equal to another major port, though there were few people who realized that fact.

Considering "might-have-beens," I often wondered at the time at the blindness of the Germans in wasting their V-weapons on London. London is so vast in extent, and the preparations for invasion were so decentralized, that no physical interruption of the invasion could result. Psychologically, also, it was a complete waste of effort. The British, about to realize their great hopes for an invasion of the Continent to make up for Dunquerque, were in no mood for defeatism. The cockney women reflected the national lack of excitement at Hitler's new mode of warfare by denying the new missiles a name—they were referred to, with stolid, contemptuous resentment, as "them."

The story might have been different if the V-weapons had been concentrated on the major English ports and staging areas where the enormously complicated business of mounting the greatest amphibious operation in history was in process. Movements specialists, considering this possibility before D-Day, could give no assurance that the operation would not be thrown out of balance and seriously hampered. The necessarily elaborate planning and the resulting rigidity in supply and shipping schedules, and the lack of administrative machinery at that time on the far shore, meant that it would have been very difficult to evaluate and replace any shortages resulting from bombing losses. Another serious possibility was that the V-weapons might be turned on the initial lodgment area, before the breakthrough, particularly on the beaches and dumps. Use of these new weapons against sensitive points in the logistical machinery might have been, militarily, much more effective than the blind and savage attacks on London, as it would have left our supply and transport system partially crippled and our build-up retarded.

The port of Le Havre proved to be badly damaged, even worse than had been expected after what was found at Cherbourg and elsewhere. The Germans, in general, devoted true Teutonic stubbornness and thoroughness to defense and demolition of ports, with far-reaching impact upon our operations. At this juncture, with rehabilitation of ports slow and difficult, the supply over beaches was maintained a few weeks longer than most of the experts had considered likely. However, early in October a heavy autumn storm interrupted operations, and by the end of the month beaches were virtually shut down, except the portion of the British beach behind the artificial harbor.

The Communications Zone staff, which could not meet the urgent supply requirements of First and Third Armies, and (later) Ninth Army, found itself in a difficult position. Everyone knew that the European Theater had been given consistently high War Department priorities as regards procurement and shipping, and the very real difficulties of Communications Zone in port and transport operations were not readily appreciated by field commanders and combat staffs. Third Army staff was particularly hard to reconcile, as it had been left with a low supply priority. General Patton's intolerance of administrative red tape or delays had given

him, by sheer process of elimination, a supply staff that had usually managed to avoid curtailing his desired operations because of logistical limitations. No one was left in doubt at the time about his annoyance at being held up.

One further reason for Communications Zone's difficulties arose around the end of August when it had failed to protest against a plan to increase the planned flow of divisions from the U.S. Until September, all divisions and other troops had staged in the U.K., and, after a month of more of processing, come over to the Continent equipped and armed, with vehicles and basic loads, ready for immediate assignment. The divisions direct from the U.S. were to begin to arrive in September, and owing to the failure to take Brest in time, they had to be crowded into the supply ports. It takes about a month to stage a division for combat after a trans-Atlantic crossing. As a result of the port congestion, some of the October arrivals had to be diverted to the U.K. for a later shipment to the Continent, and others were sent to Marseille.

In general, however, many of the supply difficulties blamed on Communications Zone at the time actually stemmed from German success in denying us the Brittany ports. Communications Zone was not responsible in any sense for the delay in reducing German resistance. The Corps assigned by Third Army to this task was all even the logistical planners felt could be spared to clear up German troops left in the Brittany Peninsula, in view of the wonderful opportunities at the time for enveloping and crushing the Germans to the east. Indeed, it was only as a result of strong pressure by the logistical planners that any troops were diverted for this purpose, but the one Corps was considered adequate. It was not known, of course, how strongly the ports would be held.

There is an element of poetic justice in the fact that Third Army, whose mission it was to clear the Brittany ports, later felt so stringently the lack of supply resulting partly from the failure to accomplish that mission. It would have been a rash man, however, who would have suggested this thought to Third Army at the time.

The situation would have been much brighter if Antwerp could have been opened soon after its capture on September 4. Admittedly, both flanks of the Scheldt were strongly held and Walcheren Island on the north was accessible only by water. Also the Scheldt itself was so thickly sown with mines that seventeen days of concentrated effort were required to sweep it after the approaches fell, and Antwerp could not be reached by shipping until 26 November.

However, it is still difficult to understand why its reduction took so long. It certainly was recognized in SHAEF as a prime objective, for its use would reduce the average length of lines of communication for two U.S. Armies by about 300 miles and of the British and Canadian Armies by about 200 miles. It would increase port capacity at our disposal by twenty to 25,000 tons per day almost at once. Both British and U.S. officers agreed on the necessity of obtaining Antwerp without delay and it was listed as a prime objective in every SHAEF directive and planning staff paper for months.

The operation to reduce the approaches to Antwerp was complex. To clear the island of Walcheren ultimately required heavy bombing, a naval bombardment, landing craft and commando elements, in addition to two divisions. Three divi-

sions had previously reduced the resistance on the southern bank of the Scheldt in a relatively simple operation. Resistance on the Scheldt approaches would probably have been much less if they had been hit at once. Unquestionably opening of Antwerp was delayed by 21st Army Group's preoccupation with the attempt to "bounce" across the Rhine for a quick bridgehead; but it seems that, even allowing for this operation, resources were available to allow simultaneous moves to open the Scheldt. If the Canadian Army had concentrated on this operation, reinforced by American troops if need be, this might have speeded up the use of Antwerp, perhaps by a month or more, and avoided some of the supply difficulties of the late autumn of 1944. However, it was noticeable that in all operations 21st Army Group assumed much of the detail planning and supervision of operations, down to include missions to be assigned individual divisions. It may be that they were unable to plan two such complex operations at once. In American practice much more responsibility for both planning and operations is delegated to Army Commanders.

It is appropriate to note that even taking the supply difficulties of this difficult period into account the U.S. Forces in Europe in 1944–45 were, on the balance, unquestionably by far the best supplied, equipped and serviced major force which any country has ever maintained in any war. Even the forces of 21st Army Group were not so well provided for. British troops gladly ate American food but U.S. troops would only eat British rations with many complaints. Our artillery support was always greater than the enemy's, and our Engineer and Medical service were unquestionably outstanding by any standards. Twenty-first Army Group, for example, had to depend on U.S. Engineers for major bridges across the Rhine. There can be no question that our military vehicles were outstanding; particularly, the jeep and 2½-ton truck. During the most stringent period, the U.S. truck companies with fifty-six 2½-ton trucks actually outperformed in long hauls British truck companies with 120 3-ton trucks. This superiority was partly due, at least, to the vision of U.S. Transportation Corps in the theater, which had insisted on obtaining two drivers per truck. War is not an exact science; and the hardships of war are always very great and bear unequally on individuals, even under the most favorable conditions. However, in terms of other campaigns and standards of all countries our troops were on the whole well serviced.

Coalition Aspects

The four U.S. Armies, the British, Canadian and French Armies, the U.S. and British Air and Naval Forces, and the U.S. Communications Zone, which ultimately composed the Allied Expeditionary Force, constituted one of the largest and certainly the most complex and formidably equipped forces ever brought under a single commander. It ultimately included ninety divisions and 11,000 fighter and bomber planes. Of coalitions in general, Clausewitz said: "Generally the auxiliary force has its own commander who depends only on his own government, and to whom it prescribes an object such as best suits the shilly-shally measures it has in view." Clausewitz's bitter comment was fortunately not applicable

to the Allied Expeditionary Force, but it is certainly true that all plans and decisions had to be obtained with more consideration and diplomacy than is necessary when only one nationality is involved. Many Americans, in fact almost all, complained at times that the high command was pro-British. It was curious, however, that no one ever mentioned the possibility that a British-led high command might have been designated or might have been more acceptable. It is no secret, in fact, that any such change would have caused widespread apprehension. The reaction to the later suggestion for a British ground force commander is ample evidence of that. History shows that any allied organization for a combined effort must of necessity be less efficient and less satisfactory than a single unified national force. And in Europe, the necessity for integrating ground force efforts with air operations and naval support added further complexity. The Allied coalition operations in 1917–18 certainly developed an abundance of organizational and administrative difficulties and conflicts of national interest. In perspective, the 1942–45 coalition will appear as a highly successful force, which without achieving any thing approximating theoretical perfection, was still better managed on the whole than any comparable force of the past.

Notes

[1] General Patton's *War As I Saw It* and Robert Allen's *Lucky Forward*, both published in 1947, have practically established as an American tradition that General Patton could have won the war in 1944 if his superiors hadn't held him back by refusing him enough supplies.

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Logistical Limitations on Tactical Decisions

Introduction. In this article adapted from his volume on logistical support in the European Theater in the official history of the Army in World War II, historian Roland G. Ruppenthal examines Allied operations in Europe in August–September 1944 and discusses how logistical considerations directly influenced operational plans and their tactical execution.

It can be taken as axiomatic that logistic considerations have a strong influence on strategic planning in modern warfare. Logistic factors also have a continuing influence on the conduct of operations, once they have begun. In the history of operations in the European Theater, there is no better example of this than the dilemma in which the Allies found themselves, in mid-September 1944, following the pursuit of the German armies across Northern France. At that time, the Allied armies stood at the German border in the north, and at the Moselle River in the south. That they were stopped there was due, in part, to the increasing resistance which a reorganized enemy was able to offer from the prepared defenses of the Westwall and along the Moselle, and, in part, to supply shortages. These shortages were the more exasperating and the more highly publicized because they occurred in the midst of spectacular successes, and because they contributed in frustrating a short-lived hope that the war might be brought to an end.

These shortages were only the beginning of a prolonged supply famine, and provided only a foretaste of how logistic limitations could affect the conduct of operations. Within a matter of days, the deteriorating logistic situation led to one of the most reluctantly made, and most debated, decisions of the war. This was the decision which General Eisenhower made, late in September, to halt offensive operations on a large part of the front and to concentrate the bulk of the Allied resources on a relatively narrow front in the north.

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The reasons for the desperate supply situation which necessitated this decision should not have been difficult to see. But the inability to continue the pursuit of the shaken enemy forces created an exasperating situation, and it was hardly surprising that the initial reaction of combat commanders should take the form of annoyance with the Communications Zone, the organization responsible for their support. This annoyance reflected both a lack of understanding of the impact which the pursuit had had on supply capabilities, and short memories concerning the invasion plan and the expected course of the operation.

Basic Assumptions

On its operational side, the OVERLORD invasion plan had been predicated on an estimate that the enemy would make successive stands on the major water barriers across France and Belgium and, in accord with this assumption, it was expected that he would make a stand at the Seine River, a line that would not be reached until D plus 90. Furthermore, plans had contemplated a fairly steady rate of advance and not the pursuit of a disorganized enemy. While such a forecast of progress admittedly was conjectural, it formed, necessarily, the basis of logistic preparations. In the belief, for example, that the Seine ports would not become available quickly, great emphasis was placed on the development of the Brittany area, including the port of Brest. In addition, at least a month's pause at the Seine was expected to be necessary to develop an administrative base capable of supporting further offensives. Even on these assumptions, the margin of safety of the OVERLORD logistic plan was believed to be nonexistent.

The development of the OVERLORD operation was quite different than expected, and the assumptions on which the schedules had been based were largely voided. For the first 7 weeks, the advance was much slower than expected, and the Allied forces were confined to a shallow Normandy beachhead. From the viewpoint of logistic support, the lag in operations was not serious immediately, for it resulted in short lines of communications and gave the service forces added time to develop the port of Cherbourg, whose capture had been delayed.

Facing Realities

Whatever temporary advantage accrued from this situation was eliminated quickly following the break-out at the end of July. By D plus 79 (24 August), Allied forces had closed to the Seine—11 days ahead of schedule—despite a lag of approximately 30 days at the beginning of the break-out. Tactically, the spectacular drive of early August brought definite advantages, for it resulted in the almost complete destruction of the German Seventh Army, and it greatly accelerated the advance to the enemy's border. From the point of view of logistic support, however, the rapid advance to the Seine foreshadowed serious complications. The fact that the OVERLORD objective was reached on D plus 79 rather than D plus 90 was, in itself, not too serious, for the supply structure was sufficiently flexible to accommodate itself to a variation of 11 days. The departure from the scheduled advance actually had been more serious. Because

of the initial lag in operations, United States forces were still at the D plus 20 line at D plus 49, and between D plus 49 and D plus 79, a period of 30 days, actually had advanced a distance which, by plan, was to have taken 70 days. The lines of communications could not be developed at the speed with which tanks and other combat vehicles were able to race forward. The result was that the armies already had used up their operational reserves by the time they reached the Seine.

Since rail and pipe lines could not be pushed forward quickly enough, motor transport facilities were strained to the breaking point in attempting to meet even the minimum needs of the armies, and the Communications Zone, consequently, found it impossible to establish stocks in advance depots. Furthermore, none of the Brittany ports had as yet been captured, and only one major port—Cherbourg—was operational.

Additional Difficulties

The arrival at the Seine marked only the beginning of supply difficulties. Despite the logistic complications which the rapid advance had already foreshadowed, decisions now were made to establish a bridgehead across the Seine; then, to encircle Paris and, finally, continue the pursuit without pause; and to broaden the entire scope of the drive into Germany by ordering an attack along the subsidiary axis south of the Ardennes in considerably greater strength than was contemplated originally. On purely tactical grounds these decisions were logically indicated, for the Allies now enjoyed a definite superiority, and the disintegration of enemy resistance offered opportunities that would have been folly to ignore. From the point of view of logistics, however, these decisions carried with them a supply task all out of proportion to planned capabilities. With the supply structure already severely strained, these decisions entailed the risk of a complete break-down.

The continued advance, late in August and at the beginning of September, consequently brought hectic days and sleepless nights to supply officers. All the difficulties, which had already begun to appear during the approach to the Seine, now were further aggravated. The main problem, as before, was the deficiency in transport. Despite great efforts, rail reconstruction was unable to keep pace with the advance. Air supply repeatedly failed to match its predicted capacity. Consequently, motor transport continued to bear the principal burden of the forward movement of supplies and it was unable to deliver even daily needs, to say nothing of stocking advance supply depots.

Comparison

The unbearable supply task which the continued advance created can best be appreciated by comparing planned with actual developments. At D plus 90, it had been assumed that no more than 12 United States divisions would be supported at the Seine. Not until D plus 120 was it thought feasible to support these divisions in their first offensive action beyond that barrier. At D plus 90 (4 September), however, 16 divisions already were being supported at a distance of 150 miles beyond the

Seine, and, within another week, the United States First Army forces were operating at the German border in the vicinity of Aachen, well over 200 miles beyond Paris. By D plus 98 (12 September), the armies had advanced to a line which forecasts had indicated would not be reached until D Plus 350. Between 25 August and 12 September, they had advanced from the D plus 90 to the D plus 350 phase line, thus covering 260 phase-line, days in 19 days. The record actually was more phenomenal than these figures indicate, because, in the earlier dash to the Seine, the armies had overcome an initial lag of 30 days. The city of Paris also had become an additional supply liability because of its liberation, 55 days ahead of schedule.

Contrary to plan, therefore, and as a direct consequence of the August decisions, considerably greater forces were being maintained at much greater distances than contemplated. This was accomplished despite an insufficiency of motor transport (which had been predicted even before D-day), despite the failure to open the Brittany ports, and despite the premature assumption of responsibilities in connection with the civil relief of Paris.

Logistic Limitations

The probability that logistic limitations might "strait jacket" tactical operations had been realized as early as 24 August, when General Eisenhower expressed anxiety over the Allies' inability to undertake, simultaneously, the various operations which appeared desirable. Flushed with success, however, the Allies had begun to develop ambitions which they had not dared consider a month earlier. The uninterrupted advance in the next 2 weeks continued to nourish the hope that strong offensives, both north and south of the Ardennes, might be sustained. In the first week of September, General Eisenhower decided that such simultaneous drives to both the Ruhr and the Saar were still within Allied capabilities and, on 10 September, he accordingly authorized an advance across the Siegfried Line by both United States armies. He admitted that the supply organization already was stretched to the breaking point, but he believed the operation was a worth while gamble in order to take full advantage of the disorganized state of the German forces.

The maintenance of the armies was a touch-and-go matter at this time, however, and it was necessary to keep a constant finger on the logistic pulse. Supply capabilities clearly were unequal to the support of sustained operations by both armies against determined opposition, for deliveries were being made at the rate of only 3,300 tons a day to the First Army and 2,500 tons to the Third—about ½ of what they required. The dual offensive was supportable only if it could achieve quick success. General Patton was informed, therefore, that if he was unable to force a crossing of the Moselle with the mass of his forces within the next few days, he was to discontinue the attacks and assume the defensive.

A Forced Decision

Within the next 10 days, the increasing resistance in both the First and Third Army sectors forced General Eisenhower to make the decision which he had

hoped to avoid. A survey of supply capabilities at this time showed that the United States port discharge was averaging less than 35,000 tons a day, several thousand tons below requirements. Even this was more than could be cleared from the ports, for the number of truck companies had been reduced greatly as a result of the demands for line of communications hauling. The net effect of these basic deficiencies was inescapable: a restriction on the number of divisions that could be supported in active operations and, consequently, a limitation in the scale of combat operations. As early as the middle of August, it had become impossible to maintain in combat all the divisions which were available. By early September, three had been immobilized and their motor transportation used to form provisional truck companies. Two more divisions arrived in the middle of the month, and it was thought that their motor vehicles might have to be utilized in the same way. Logistic planners estimated that there would be 29 divisions in the 12th army Group by 1 October, but thought it unlikely, on the basis of the current logistic outlook, that more than 20 could be maintained in combat as far forward as the Rhine at that date.

This gloomy forecast served to underscore two conclusions which already had been accepted at Supreme Headquarters—that even should it prove possible to capture both the Saar and Ruhr objectives, these areas were at the absolute maximum distance at which Allied forces could be supported for the time being; and that it would be absolutely imperative to develop additional logistic capacity before attempting a power thrust deep into Germany.

The situation, in mid-September, clearly indicated an urgent need both to shorten the lines of communications, and to secure additional port capacity. The maximum force which could be supported through Cherbourg and the beaches was being reached rapidly. In fact, the capacity of the beaches was certain to decrease with the advent of bad weather, and new capacity also was required to compensate for that lost in Brittany. The obvious solution to this dual requirement lay in the development of the Seine ports and Antwerp.

In light of these circumstances, General Eisenhower, in mid-September, considered two possible courses of action: the concentration of all resources behind a single blow on a narrow front directed toward the center of Germany (a proposal favored by General Montgomery); or an advance along the entire front with the aim of seizing suitable positions on the German frontier where the Allied forces could regroup, establish maintenance facilities, and prepare to support the mass of the Allied forces for a drive into Germany. The first course, often referred to as a "knife-like thrust" to Berlin, was rejected on the grounds of both tactical and administrative considerations. Logistic resources likewise were lacking for the full implementation of the second course. The Supreme Commander, nevertheless, decided in favor of the second plan, which provided that the allies push forward to the Rhine, secure bridgeheads over the river, seize the Ruhr, and concentrate on the preparations for the final nonstop drive into Germany. Because of the limited logistic capabilities, however, the timing of the Allies' efforts toward the attainment of immediate objectives now became of utmost importance. The implementation of this plan, consequently, required a succession of attacks, first by the 21st

Army Group, then by the First Army, and, finally, by the Third Army, with supply priorities shifting as necessary.

Future logistic needs also were a major factor in the assignment of missions, for General Eisenhower specified that additional bases must be secured simultaneously with the attacks eastward. Accordingly, General Montgomery's 21st Army Group was given the mission of securing the approaches to Antwerp or Rotterdam, and the capture of additional Channel ports; and General Bradley's 12 Army Group was to reduce Brest as quickly as possible and make physical junction with the Allied forces from the south, so that the supply lines leading from Marseille might assist in the support of the 12th Army Group.

Another Deep-Water Port a Necessity

Several days earlier, on 17 September, General Montgomery had launched a combined United States–British airborne operation in Holland to secure a bridgehead over the Rhine and to turn the enemy's flank in the north. However, General Eisenhower had conceived of this operation as having only a limited objective, and he emphasized this point to his top commanders and staff officers, stating that he wanted general acceptance of the fact that the possession of all additional major deep-water port on the north flank was an indispensable prerequisite for the final drive into Germany. He considered even the present operation in the north a bold bid for a big prize in view of the current maintenance situation. Nevertheless, the considered the operation amply worth the risk. But, he stressed repeatedly the conviction that a large-scale drive into the "enemy's heart" was unthinkable without building-up additional administrative capacity, and this meant the opening of Antwerp.

Reasons for the Dilemma

The dilemma in which the Allies found themselves at this time was, of course, a direct outcome of the earlier decisions by which logistic considerations had been subordinated repeatedly to the enticing prospects which beckoned eastward. General Eisenhower, himself, admitted that he had been willing to defer the capture of ports in favor of the bolder actions which had taken the Allied armies to the German border. The first such deferment had been made on 3 August, when the bulk of the Third Army was turned eastward rather than into Brittany as originally planned. Logistic requirements again had been subordinated 2 weeks later when the decision was made to cross the Seine and continue to drive eastward. Such deferments were no longer permissible.

Antwerp had been captured early in September, but estimates made later in the month indicated that that port might not begin operating before 1 November. As a result, there was every prospect that the United States forces would have to depend on lines of communications reaching all the way back to Normandy. Because of this, the total tonnages which the Communications Zone could guarantee to deliver were sufficient to support the attacks of only one of the American armies if all

the other United States forces reverted to the defensive. Even such commitments required the postponement of many essential administrative measures such as the building of advance airfields, the winterization of troops and equipment, and the replacement of wornout matériel. In view of the priority which operations aimed at the Ruhr now held, it was inevitable that the burden of the sacrifice should be borne by those 12th Army Group forces operating south of the Ardennes—that is, General Patton's Third Army.

The developments of the next few weeks produced little cause for altering the conclusions reached in mid-September. At the very end of the month, the Communications Zone presented figures on its delivery capabilities which revealed even more clearly the impossibility of supporting large-scale operations east of the Rhine. The 12th Army Group had indicated, on the basis of daily maintenance needs of 650 tons a division, that its requirements would total 19,000 tons a day during the first half of October, assuming the employment of 22 divisions, and 23,000 tons a day by 1 November, when the strength of the army group would reach 28 divisions. In addition, however, the army group requested that the Communications Zone deliver 100,000 tons of supplies over and above these daily requirements in order to meet deficiencies in equipment and establish minimum reserves. The Communications Zone's reply was discouraging indeed. It announced that it would be approximately 60 days before any substantial tonnages could be built up in the forward area. September deliveries had averaged only 8,000 to 10,000 tons a day to the forward areas, and, for the entire month of October, deliveries would not even meet daily maintenance needs. Not until mid-November did the Communications Zone expect its port and transportation situation to improve sufficiently to begin building reserves, over and above the daily needs, in all the army areas. The outlook for the next 6 to 8 weeks was, therefore, a depressing one, for there appeared no escaping the prospect that the forces which the 12th Army Group could maintain *actively* operational would either have to be reduced in size or continue on the starvation scales that had characterized their support for the past several weeks.

It also was clear that the maintenance of large-scale operations would remain unsatisfactory until the port of Antwerp and adequate rail lines of communication were made available. The operations of the 21st and 12th Army Groups, consequently, were to be dominated throughout the fall of 1944 by the necessity of developing a new administrative base in closer proximity to the front lines. Tactical operations, to paraphrase an old maxim, had definitely become the art of the logistically feasible.

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Achievements of the Services of Supply in the European Theater of Operations

Introduction. Lt. Col. Randolph Leigh of the Historical Section, European Theater of Operations, provides a narrative summary of the activities of the Services of Supply in the European Theater after D-Day. He provides a good deal of detail regarding the structure of logistical forces in Northwest Europe, the magnitude of their achievements, and such topics as the Red Ball Express.

Brains and Guts

On top of the difficulties caused by the storm of 19 to 22 June came the increasing demands upon the over-the-beach service arising from the fact that Cherbourg still held out. The invasion plan had called for its capture by June 14, but the port was not taken until June 27, and the work of opening it for service took 21 days instead of the three days estimated.

The port of Cherbourg had been systematically destroyed. Altogether 109 vessels had been sunk in the narrow channels. They ranged in size from the *Solglint*, of 12,246 tons down to small fishing vessels. Barges had been sunk two-deep in some places, and bridges, freight cars, and miscellaneous debris, including 75 tons of concrete from the demolished Gare Maritime, the great landing station for travelers, had been thrown in to add to the difficulty of putting the port in use again.

The obstructions had been placed to take advantage of the tidal variation, which ranged from eight to eighteen feet. Consequently, even though a vessel might come in at high tide, it might find itself sitting on a sunken barge or a mine if it could not discharge its cargo and get out in a few hours' time.

By July 14 the west end of the Grande Rade and the west end of the Petite Rade had been cleared of mines, and on July 16 the first ships entered the Grande

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Rade. Part of their cargo was brought ashore by DUKWs. The next day barges were brought into the Bassin à Flôt.

The first bulk gasoline was discharged from a U. S. Navy tanker on July 24. That was only one day before the breakthrough of our forward forces near St. Lô. The next day arrangements were made at Cherbourg for Diesel oil and motor transport and aviation fuel to be discharged simultaneously. On July 27 two sea trains, which had been brought from the United States and which were the only ones in use in any army, began discharging rolling stock by barge. Coal coasters began unloading on August 8. The first Liberties berthed on August 9.

Thus, up to and beyond the very eve of one of the swiftest advances in the history of war, the supply build-up had depended chiefly upon two open beaches. The extent of this dependence on the beaches rather than on regular ports during the crucial first seven weeks of the invasion is shown by the tonnage statistics for that period. Up to the end of July, the landing of 912,805 men and 315,427 vehicles had been carried out under conditions which, according to military theory generally accepted in previous wars, would have made the accomplishment impossible.

Another factor complicated the problem of unloading across the beaches. The first ships did come over with supplies pre-loaded in England with a view to unloading over the beaches. But later ones, on the theory that Cherbourg would be available, had been loaded for the normal harbor methods of unloading, and the cargoes were therefore extremely hard to handle over the beaches.

Ingenuity and daring were called for by many unforeseen problems. For example, a Liberty ship has five hatches. Two of these have Jumbo booms, capable of lifting fifty tons, but the others have just the ordinary ship's boom that lifts only six to nine tons. It is a first rule of the stevedores who direct the unloading of cargoes that a boom must never be overloaded. But the stevedores found themselves in a situation where they had to overload grossly, or not unload fast enough. They did overload and sometimes the booms broke. All the men knew that a breaking boom is very dangerous. They faced the risk—and got the stuff unloaded.

Likewise, because of lack of proper port facilities, DUKWs, Rhino ferries and LCTs had to be used much longer and harder than had been expected. The DUKWs were often used to carry supplies five miles inland which normally they should have carried only well up onto the shore. The DUKWs should have been laid up for repairs at least a fourth of the time but they could not be spared. They were expendable and were spent, and wearing them out severely taxed the strength of the men who drove them. In the same way Rhinos were operated until they actually broke in half.

Moreover, casualties in the first DUKW battalions that landed soon caused a shortage of DUKW drivers. To meet that situation men who had never have been in a DUKW were taken out of Quartermaster battalions and put to driving them.

Men and machinery alike had to be sacrificed to get supplies as far inland as they were needed. There was, for instance, double-handling of the shingle on Omaha Beach which had sheltered hundreds of men during the first minutes of the assault. As soon as vehicles got ashore there was need of a roadway firm enough to sustain the pounding of heavier vehicles. The only road material at hand was the

gravel of the shingle itself and this was scooped up and used. A few weeks later the heavy winds began piling the water up higher on the beach, and with the barrier of the shingle gone, the biggest waves broke far upshore cutting away the temporary Army road. It then became necessary to hold the sea by hauling the gravel back and reconstructing several hundred yards of the shingle.

During that trying period of unloading the LSTs proved their suitability for "drying out" on a beach with a firm bottom and the necessary tidal range. More than 200 of them were so used, discharging their cargo direct to the dry shore without pontoon causeways, floating piers or ferry craft. Also well established by that time was the effectiveness of beached lighters—"dumb barges." Six of these large steel barges were towed to the assault area and beached late on D-day. Their cargo of ammunition furnished a reserve supply available if foul weather should delay further unloading offshore.

The exploitation of the dumb barge was, however, limited by the shortage of powerful tugs. These were tied up to a considerable extent, at first in towing the ill-fated Mulberry A elements to the assault area, and later in trying to save as many as possible of the vessels that were damaged within its theoretical safety zone.

The beaching of coasters, for unloading at low-tide, was also successfully resorted to. This was first authorized by General Bradley on June 20 when the serious supply problem created by the storm made it necessary to risk the vessels and their cargoes in that manner. The cargo of every coaster handled that way was safely unloaded. Many of the men of the port battalions had already had experience in unloading Army cargo, but they had always worked in ports where standard unloading facilities were available. Thus officers and men learned new unloading operations through actually doing them.

The number of French civilians used in quay operations was never large; the highest for any one day in Cherbourg was 778. On the other hand, most of the 41,500 prisoners of war in the Normandy Base Section were put at the work of clearing the harbor or in various proper types of unloading work. The prisoners were, of course, a problem to the SOS on the side of security and sustenance. And there was also the problem of seeing that they were not used in violation of the terms of the *Rules of Land Warfare*.

The tremendous handicap of unloading upon a beach as contrasted with unloading in a port became evident as soon as Cherbourg began to function. By the end of November the weather was so bad that the beaches could not be used for unloading at all. In November Cherbourg alone handled 433,205 tons, exclusive of bulk petroleum products and vehicles.

The trend in the supply build-up over a period of a few months reflects the swiftly changing conditions at the beaches and in Cherbourg. Up to the last week in July the trend was toward the establishment of huge dumps and depots near the beaches and the port. Some of those around Cherbourg were a few blocks from the docks, though a few were thirty miles inland. Dumps and depots were, of course, moved inland constantly to keep them near the armies. However, that system, a necessity at outset became a liability when the armies began their race across France. Normandy Base Section with thousands of tons in storage was soon left

far behind the front at which these supplies were needed. That situation continued through August and September.

After October the chief dumps were in the forward areas. In the intermediate period, while balanced stocks were being built up in the forward areas, the armies continued to be supplied in large part from Normandy Base Section. As late as the end of October, 73.1 per cent of all tonnage on the Continent was in Normandy Base Section. But by the end of November only 46 per cent was there; and by the end of the year only 28.2 per cent. This forward movement of storage tonnage was particularly reflected in ammunition, which was rapidly concentrated in the Advance Section dumps of the Communications Zone.

The eastward dash of the armies also put emphasis on the organizational structure of the SOS which attracts but little attention under conditions of static warfare. As their supply lines stretched out behind them, the armies set up rear boundaries, back of which responsibility fell on the Communications Zone. That zone eventually covered most of France and Belgium. Since it was impractical for a single headquarters to supervise closely the handling of supplies, the operation of hospitals, the use and guarding of prisoners of war, and countless other military activities, the large area was divided into a number of sections, each with its own headquarters.

From these subordinate headquarters the work of most Services of Supply soldiers was directed. At the end of November there were nine such areas. On October 14, 1944, there were already 464,158 troops assigned to the Communications Zone on the Continent. Of these, 61,128 belonged to the Advance Section, which had headquarters at Namur, Belgium. The Advance Section had followed the First and Third Armies and given them close support. It did the same thing later for the Ninth Army. The areas which it had successively vacated were taken over by other sections. The Normandy Base Section, with more than 123,000 troops, operated Cherbourg with its headquarters there, and other near-by ports.

The effective roles played by these SOS sections were due not only to careful planning but also to solid home roots. In the United States the concept of decentralization of operations was inherent in the Army's division of the country into nine service commands. In World War I France had been divided by the U. S. Army into six Base Sections, an Advance Section, and an Intermediate Section. The same plan was followed in the United Kingdom during the present war, where five sections were in operation by the end of 1943. The base sections were further subdivided into districts. Those organizations not only performed their functions in the invasion build-up, but also looked forward to their future tasks in the liberation of the Continent, and in both cases greatly speeded up the work of handling the unprecedentedly large volume of supplies.

As an area in France was opened for supply operation, the commander of one of the base sections had a sizable part of his staff moved to their new assignments. Thus Eastern Base Section, which in England had supported the Eighth Air Force, took over the Brittany Base. Western Base, which had operated the chief American ports in Great Britain, took over Channel Base. Headquarters of Northern Ireland Base Section became the nucleus of Loire Section; and Southern Base Section,

which had accommodated the largest part of the ground forces in England, reappeared as Oise Section. Central Base Section, London, became Seine Section. As the separate British base sections were inactivated they were absorbed into the new United Kingdom Base, in which the original sections became districts. The importance of this over-all UK Base Section back in England is shown by the fact that 160,000 SOS troops were assigned to it.

But no analysis of organizational structure and no bare tonnage summary can do justice to the skill, courage and inventiveness which the individual members of the SOS displayed in solving the problem of supplying their runaway armies as they swept eastward toward Germany.

3,065,505 Men on a Shoestring

With Omaha and Utah Beaches funneling men and supplies ashore and with Cherbourg beginning to function, the infantry divisions were able during the first three weeks of July to carry on their bitter war through the hedgerow country, gaining almost yard by yard southward to the Lessay–St. Lô line. Then came the breakthrough to Avranches at the head of the Bay of St.-Michel, where the Brittany and Normandy peninsulas join and the citadel monastery of Mont St.-Michel stands.

Nothing could more clearly emphasize the contrast between the comparatively slow warfare of other ages and the war of swift movement of the summer of 1944 than the tanks and planes that swept past that ancient stronghold as General Hodges' First and General Patton's Third Armies began their dash across France. That dash liberated Paris and, indeed, France itself, when it was augmented almost midcourse by the northward movement of General Patch's Seventh Army and the French First Army, which had landed together on the Riviera on August 15 as the Sixth Army Group, commanded by General Devers.

The American Ninth Army, under General Simpson, which had been thrown successfully against Brest, also was soon able to turn eastward and move toward the German border. Meanwhile the British had fought their way across Northern France and Belgium and were not stopped until they got into Holland. With those Allied triumphs the advances came to a temporary halt. Thus, within a period of barely two months, the bridgehead in France had been expanded into a vast siege camp set up at the gates of Germany.

The advance had been so rapid that three months after D-day the American armies held positions which, according to plan of the campaign, they did not expect to reach until nine months after D-day.

From the standpoint of supplies, this was the biggest operation-on-a-shoestring in the history of warfare. A completely mechanized overseas force, without proper port facilities, without an adequate highway system and without a suitable railway service, had chased the most highly mechanized armies that Europe had ever known from their strong coastal positions to their main fortifications 350 to 700 miles inland. They had now begun the assault upon the inner fortress of Germany itself.

In considering the supply problems of such a campaign it is important to bear in mind in two facts. First, in evaluating this mechanized war it is totally misleading to assume that it was a simple matter of German *versus* American productive power. It was in reality a struggle between the productive power of German Europe and that of America. And German Europe meant a hard-driven, primarily industrial population of close to 370,000,000 people who had been working for four years under masters intent upon a military economy. Furthermore, America's possible maximum output for war in the ETO had been reduced to sustain a war in the Orient, and further reduced by assistance willingly given to valued allies.

Next, admitting that America's productive power in America was superior to that of German Europe in Europe, it was always misleading to measure the American war potential in terms of what could be produced in America, it had to be assessed in terms of what America could deliver to her ability to deliver the men and the matériel wherever in Europe Germany might choose to make her last stand.

As it developed, Germany chose to make that stand beside her chief manufacturing centers, and in the area in which her land and water communications were the most highly developed. Our own supply planners were handicapped by not knowing where that stand would be made and exactly what type of supplies would be in heaviest demand. In contrast with Germany's short-haul supply problem, America had to carry the war to Germany across more than 350 miles of French soil (until Antwerp became usable) and more than 3,000 miles over the sea.

This, then, was a war of communications in the strictest sense of the word. Of course all wars are that, just as all human activity is limited by communications. In this war a soldier unsupported by machines and by all the complicated services and replacements that machines require would be utterly helpless, for he would be opposed by men whose striking power was multiplied a hundredfold by machinery.

In the war of communications there were three distinct phases of transportation with respect to the armies coming into Europe through Normandy. First there was the truck phase, in which supplies were pushed in right behind the fighting men and put into temporary dumps near the beach. That soon expanded into the long-haul trucking phase, known as the Red Ball Express, which bridged, the period of emergency while the armies were advancing and while the railroad lines were being put into condition.

The second was the railroad in which despite demolished bridges, inadequate equipment and destroyed tracks, the American railroading tradition established a new record for delivering the goods. The third phase involved the utilization of the port of Antwerp, which meant a tremendous improvement over the original shoestring method of supply from Western France, because Antwerp was of vast capacity and close to the enemy—at times too close.

During the trucking phase, mud was an early and continuing problem. The Norman peasant attributes the sturdy leg and shoulder muscles of his livestock to the exercise they get in pulling through that muddy soil. The troops who had to pull themselves and their vehicles through the same mud had reason to believe that legend.



Gasoline tankers of the Red Ball Express

With the early arrival of fall rains the heavy invasion vehicles broke up the old French roads and churned up the fields. Conditions were at their worst in the dump areas which were mainly located in pastures. Traffic, plus the digging and later refilling of foxholes, had destroyed all the surface vegetation that might have served as a partial ground cover.

Despite the use of thousands of yards of pierced steel planking and Air Corps matting, the dumps became mire. In the Engineer Supply Dump on Omaha beach the mud was at one time thigh-deep. No wheeled vehicle could go either in or out under its own power. Trucks moving the contents of the dumps to forward areas had to be towed in and out by bulldozers and other tracked vehicles.

The mud condition soon cut down the number of usable beach vehicles, which had already been greatly reduced to provide vehicles for the long-distance trucking lines. New vehicles often went onto the deadline within a few weeks with transmissions badly worn by excessive use of the low gear and the four-wheel drive. Brake drums were also destroyed by seepage of mud and grit to the inner surfaces.

A tire shortage was made more acute by another difficulty. Over the whole beach area were scattered shell fragments, pieces of metal equipment, bits of barbed wire and twisted steel fence posts left behind after the landing battle. In dry weather this material would have worked below the surface and stayed there. In the

mud, however, it began churning about, cutting tires to ribbons. And in the mud the pierced-steel planking bent under the weight of the vehicles and its sharp, upturned edges shredded thousands of tires. As a result every organization had vehicles out of service from the lack of tires and tubes. On one morning a single QM truck battalion reported 54 flat tires from a single night's work.

When the time came for setting up the Red Ball Express and supplemental long-haul systems, still another difficulty presented itself. There was a serious shortage in the 6-, 10- and 12-ton "semi-trailer" class of vehicles, which are built for long-distance work with maximum pay loads. That, however, was not a surprise, for the Transportation Corps had known long before the invasion that all its requirements for such vehicles could not be met. The situation meant that other vehicles, less adapted to the task, had to be used far beyond their rated capacity in order to get the supplies where they belonged. It also put a severe strain upon the men.

Operation of the Red Ball Express began on August 25, 1944, under the Motor Transport Brigade of the Transportation Corps, and it ended November 16. The Engineers prepared and the Military Police installed over 25,000 directional signs in English and French along the route.

At first the system extended from St. Lô to Chartres and then, by successive additions, it grew in length until the circuit extended over 700 miles and was the longest one way traffic artery in the world. At the outset 5,400 vehicles were available for the run.

For the Red Ball vehicles roads and bridges had to be constructed by the Engineers and maintained often while they were being used. During the peak period it was necessary to use three battalions of Military Police, a regiment of Infantry and a large number of French police to direct traffic and enforce the rules of the road. On the peak day, August 29, the tonnage hauled reached 12,342 tons. The daily average tonnage was 5,088 tons over the 81 days during which the Red Ball Express was in operation. When use of the route was terminated on November 16, about 410,000 tons had passed over it for varying distances.

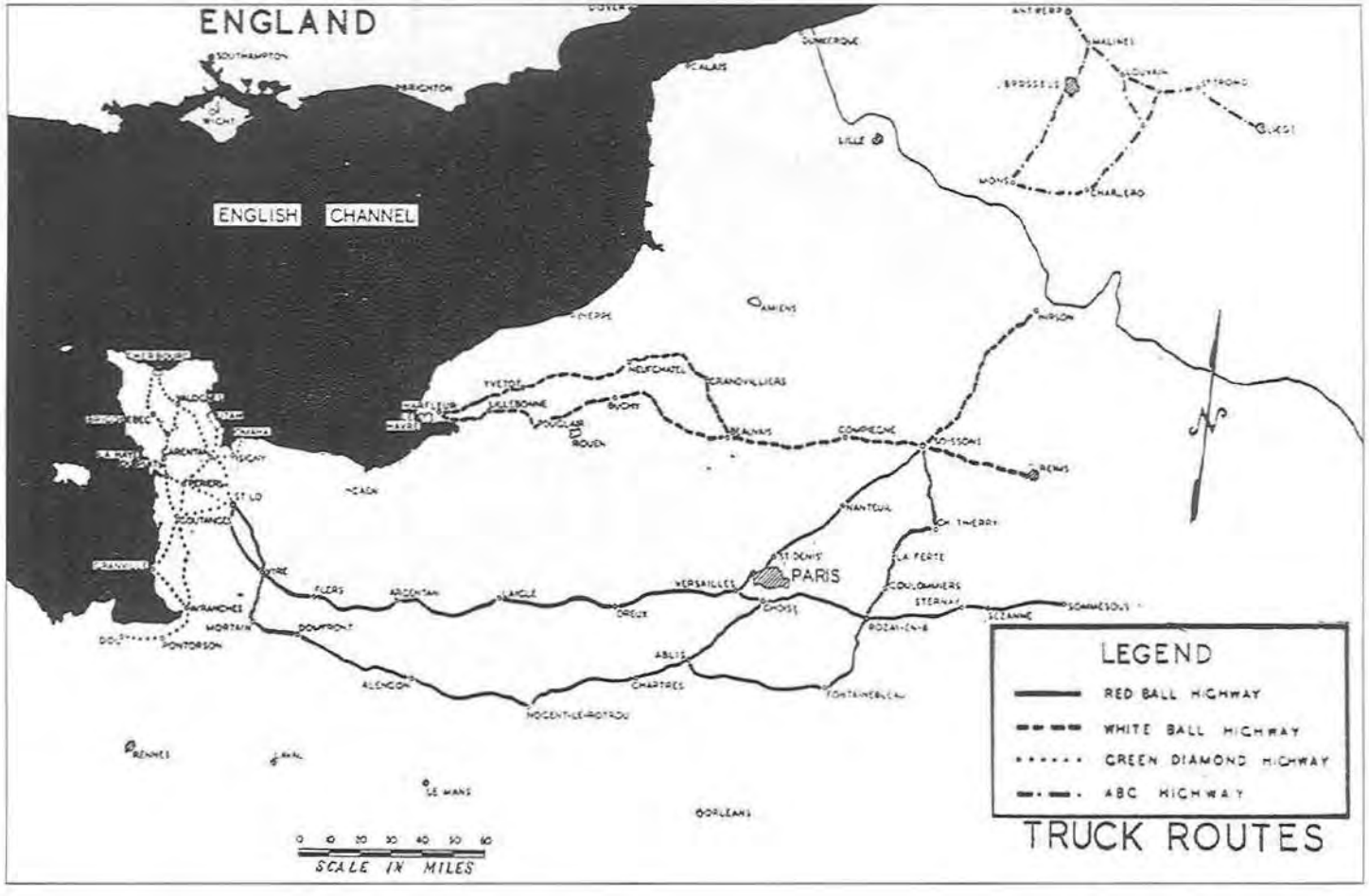
In addition to the Red Ball system there were others. The Green Diamond carried 15,590 tons of rations and ammunition from Cherbourg and the beaches to Dol between October 14 and 31.

The Lions Express operated between Bayeux and Brussels from September 16 to October 12, and carried oil, coal and ammunition. More than half of its 17,556 tons went to the British.

The White Ball Express began operations on October 6. By December 13 it had moved 140,486 tons from Le Havre and Rouen to Paris.

The ABC Express from Antwerp began November 30 and by December 31 it had moved to the northern front 51,535 tons of cargo, exclusive of oil products.

Bulk oil products discharged on the Continent from D-day through February 28, 1945, amounted to 2,352,875 tons. That tonnage was moved by pipeline to pipeheads or decanting points at inland locations. From these points, it was moved forward by motor transport, rail or barge, or, on the other hand, it was moved directly from port to forward dumps in tankers. Almost all the motor fuel in


ENGLAND
ENGLISH CHANNEL
SOUTHAMPTON
BRIGHTON
WIGHT
DUNKERQUE
CALAIS
DIEPPE
AMIENS
ANTWERP
MALINES
BRUSSELS
LOUVAIN
ST TROND
GHENT
LILLE
MONS
CHARLEROI
MEULAN
MANTES
EVREUX
LISIEUX
HONFLEUR
LE HAVRE
ETRETAT
FECAMP
YVETOT
BOLBEC
GODERVILLE
BUCHY
ROUEN
NEUFCHATEL
GRANDVILLIERS
BEAUVAIS
COMPIEGNE
SOISSONS
REIMS
NANTEUIL
LA FERTE
COULOMMIERS
STERNAY
SOMMESOUS
ST DENIS
PARIS
VERSAILLES
ARGENTAN
FLERS
ALENCON
DOMFRONT
MORTAIN
AVRANCHES
PONTORSON
DOL
ST LO
COUTANCES
GRANVILLE
CARENTAN
BAYEUX
CAEN
ABLIS
CHARTRES
FONTAINEBLEAU
ORLEANS
LE MANS
RENNES
0 10 20 30 40 50 60
SCALE IN MILES
LEGEND
RED BALL HIGHWAY
WHITE BALL HIGHWAY
GREEN DIAMOND HIGHWAY
ABC HIGHWAY
TRUCK ROUTES

pipelines was picked up and moved by rail or truck in package from (5-gallon cans) or in bulk (rail tank cars or motor-truck tankers with trailers). The only POL (Petroleum, Oil, Lubricants) not moved by the Transportation Corps at least once was that which was tapped from the pipeline for local use.

At the end of 1944 the Transportation Corps was operating 198 Quartermaster truck companies or a total of some 10,900 vehicles. Fourteen of the companies were POL tankers. The driver of one of the large tanker-trailer combinations, carrying 4,000 gallons, commented on a typical trip as follows:

"The size of these things makes them hard to handle. The gas splashing inside throws you from side to side. This affects your steering. The 'dolly' [trailer] does not exactly follow the tanker. You have to make allowance for this, especially around curves and where the road is slanted. You have to be careful or they jackknife. You can't use tractor brakes. I am a squad leader, and one night I had eight trucks out. A guard pulled us up by the side of the road and told us to disperse because it was time for strafing. It had been happening every night there. We pulled up in the hedges and hit the dirt. Sure enough a Jerry plane soon did strafe the road, but we were safe because we had been warned.

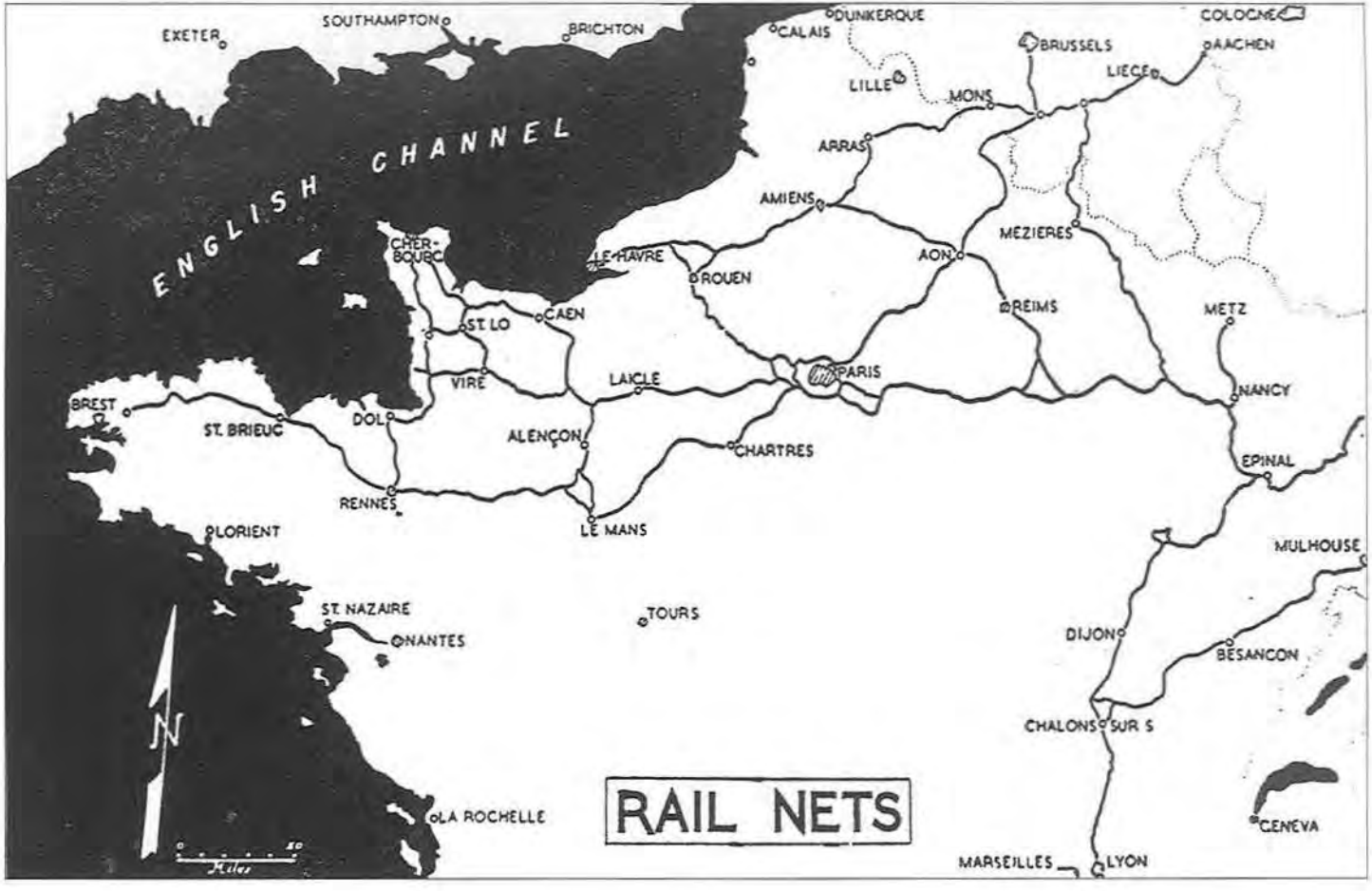
"Another night we were taking a short-cut route between Vire and Mortain. An MP stopped us and said, 'That's still Jerry's territory.' That gave us an uncomfortable feeling. Our artillery was behind us. It might have opened up any time. There were bullets whining around us occasionally, but we didn't know whether they were ours or theirs. I ran over a dead German that night. I didn't see him in time to stop. We saw some swell souvenirs on that trip but we didn't stop to pick them up. We were afraid of booby traps, and we didn't know exactly where the front line was."

The railroad phase of transportation across France was a brilliant example of determination and ingenuity. The first railroad troops to reach France, an advance party of the Second Military Railroad Service, arrived on June 17. They found a mixture of good and bad conditions. The good news was that the Germans had not used the mechanical track destroyer with which they had effectively minced up miles of Italian rail lines. In addition many of the roundhouses and shops were still intact. French rolling stock was also on hand, some in excellent condition but most of it old. The age of some of the equipment is illustrated by the fact that 12 locomotives found at Cherbourg had done service in World War I and had been turned over to the French, and finally, after serving the Germans for four years, had come into American service again in World War II.

Even before the fall of Cherbourg a few work trains were running, and Army Engineers went in right behind the troops who took that port. They began at once to restore the line which had been cut by destruction of the bridges and tunnels leading into the city.

As early as July 11 the first scheduled rail run in France was made from Cherbourg to Carentan. The first train included two streamlined luxury cars left behind by the Nazis.

In the establishment of the Carentan service the railroaders had their first taste of combat operation. For two weeks after the fall of Cherbourg the right-of-way


ENGLISH CHANNEL
EXETER
SOUTHAMPTON
BRIGHTON
DUNKERQUE
CALAIS
BRUSSELS
COLOGNE
AACHEN
LIEGE
LILLE
MONS
ARRAS
AMIENS
MEZIERES
AON
CHER-BOURG
LE HAVRE
ROUEN
REIMS
METZ
ST LO
CAEN
VIRE
LAICLE
PARIS
NANCY
BREST
ST. BRIEUC
DOL
ALENÇON
CHARTRES
EPINAL
RENNES
LE MANS
MULHOUSE
LORIENT
ST NAZAIRE
TOURS
DIJON
NANTES
BESANCON
CHALONS SUR S
LA ROCHELLE
GENEVA
MARSEILLES
LYON
N
RAIL NETS

partially paralleled the front lines. Every engine was a potential target for a German 88. One bridge at Carentan was under fire during the entire two weeks, but either bad marksmanship or the luck that follows railroaders kept it intact.

By the end of July, 333 American train runs had been made, 31,907 tons of freight had been carried and 4,524 passengers had been moved. Late July saw troop trains running from the beach landing points to Cherbourg, and on August 4, the first hospital train, improvised out of converted boxcars, started the medical run between Lison and Cherbourg carrying the wounded from the St. Lô sector.

Until the end of July railroad development was going according to plan, and there was little of the Wild West type of excitement. However, immediately after the breakout from Normandy all the normal plans were on the junk pile. Generals up on the line began to call for supplies in trainload lots, and the pressure was on. The Engineers rose to the emergency with their track repairs and bridge replacements. Signal Corps linemen began to spin out their long lines of communication.

The tempo of the service units kept pace with that of the armies. The great emphasis was on speed. New lines were established and secondary routes were built up to reroute traffic blocked by destruction of major bridges.

There were inevitable but irritating delays. Language difficulties striving toward a common goal. Sometimes orders got confused and French civilian crews, seeking rails for lines they were reestablishing, cannibalized track on which American Engineers had just completed repair work.

Marked differences in technique were revealed at times between the French and the Americans. The French had been trained in methodical roadbed construction. As one American officer put it "they wanted to tamp every bomb hole down with a shovel." The Americans emphasized speed, and insisted that the first thing essential was to get the track down so that the trains, or most of them, could get through. The refinements could come later.

On August 14 the American front was at Mayenne. General Patton, planning his next move, said that if he could get 30 trains of ammunition and POL in 14 days he could take Paris. A railway operating battalion said they could do it. The battalion arrived at Mayenne on August 15 and almost immediately long trains began rolling toward Le Mans. Snipers peppered the train, and German machine guns, firing armor piercing shells, punctured some of the boilers. But the trains got through. Some of the crews went five days without sleep, but General Patton got 36 trains in five days. On August 30 the first train went into Paris.

By the end of August the revitalized rail system consisted of 750 miles of track, but it was track such as no States-side railroader would have relished. Craters made in the roadbed by 500-pound bombs had been hastily refilled. Bridges were dangerous for trains going faster than ten miles an hour. Up to that time, American locomotives had not arrived in any numbers and the full railroad personnel was not yet on hand.

The most direct route eastward was still out, and secondary lines had to be used. It was a rambling run: from Cherbourg to Coutances to Folligny, thence to Avranches and St.-Hilaire. From the St-Hilaire the line ran southwest to Fougères

and thence straight east to Mayenne. From Mayenne it went southeast to Montsurs, and then on east to the railroad at Le Mans. It was not economical routing as railroad operations go but, as one officer pointed out, economists and field armies rarely follow the same textbooks.

That first run, according to the colonel who piloted it, was strictly a Casey Jones. French civilian railroaders had not then been cleared for operational work, and the men who manned the trains were all Americans. Few of them had been regular engineers back home.

Nevertheless these trainmen who were made into locomotive engineers practically overnight were not entirely green at handling locomotives. An American fireman serves his apprenticeship for an engineer's rating in the cab, and even as a fireman he usually spells the engineer behind the Johnson bar (throttle) as a regular practice. Similarly for the brakemen who suddenly found themselves hoggers (engineers), the experience was not entirely novel. Practically all of them during their civilian work had shunted yard donkeys (switch engines) about. Besides, whatever they lacked in experience was more than made up for by what they showed in courage.

The locomotives were not of the type with which American trainmen are familiar, and the trains did not have adequate braking power, according to American standards. Furthermore, the engines were "left-hand-drive," and reversing was not a matter of simply throwing a gear lever in the usual American manner, but one of winding a cumbersome reverse wheel. In addition, the route to Le Mans was absolutely without communications. The trains at first had to take off and stay unreported until they reached their destination.

Some of the crews had been in France for only 48 hours. None had ever been over the Le Mans route. Indeed, no officer from the Railway Service had surveyed its whole length. However, the construction engineers reported that the line was open, and that was enough for that strange railroad on which the ghost of Casey Jones was in the cab. The engineers were given maps and K rations and were told to get rolling and to use their ingenuity.

Most of the early runs were made at night, and strict blackout rules were in force. Trainmen did not know what curves or grades were ahead. But they did know that there were soft spots in the roadbed and that there were bridges of perilously limited strength. For that reason it was hard to build up on the level stretches the momentum needed to climb the hills. As a result many trains lost speed and stalled on the up-grades. Then the engineers backed away and took a running start, or else cut their trains, pulling half over the crest to a switch siding and then backing down for the rest. That meant that a brakeman had to go back and flag down the next train in the convoy. Some brakemen had flashlights for that signal job, but others used cigarette lighters.

There were no water points on the road but the first crew that went through stopped in the larger towns and turned out the local fire departments to pump for them. Then they told the firemen to stand by for other trains to come, and continued their run. If air lines broke or compressors failed on the down-grades, the crews could only "let 'em go" and pray for a clear straight track ahead.

Their prayers were not always answered. For example, there was that dark night when, between Rambouillet and Maintenon, a "bad order" engine had piled up traffic for more than two miles while crews worked frantically on the locomotive to get it moving and clear the line. Suddenly, without warning, a blacked-out train, loaded with thousands of jerricans of high-octane gasoline, came roaring down the grade. It was, of course, out of control, and crashed into the rear train with a terrific impact.

The crew of the runaway train leaped for their lives just before the collision. Jerricans were tossed a hundred feet into the air, bursting like timed artillery shells and spraying the area with jagged steel and fire. Working up to within three cars of the flaming locomotive, the crewmen cut the rammed train and pulled up enough slack in the line-up ahead to save the train from fire. Similarly the colliding train was cut behind the wrecked locomotive, and the cars immediately behind it were pulled to safety.

Single-track operation was particularly hazardous and nerve-straining at the outset before a dispatching and communication system could be set up, and engineers were often forced to feel their way across the countryside.

At night, and even during the day in stretches where the view was limited, it was necessary to send a flagman ahead to relay to the engineers the news on track conditions. Meanwhile, the engineer could only nervously finger the brake valve, waiting for the first indication of a washout (stop signal), which would mean that he had to "big-hole" (apply his air-brakes fully).

Because there were no coaling points, the crews carried extra fuel on their trains, and shoveled it into the tenders en route. Each train started with double locomotives and instruction to run one off onto a siding and continue with a single locomotive if coal ran short. Sometimes part of the train had to be left.

The train crews had no reliefs. Sixty hours in the cab was normal on the Le Mans run and one crew kept at it steadily for 84 hours. All along the way the tracks wound through country in which Germans were still roving, and at Mayenne the front was only six miles away.

Nevertheless, just as that first batch of thirty trains got through intact, so did most of those that followed on subsequent days. Officers of the Second Military Railway Service remember with amusement the bewildered yardmaster at Le Mans who met the pilot car that preceded the first train. It was the first traffic he had seen since the departure of the Germans.

The yardmaster explained that certain technicalities of French railroad operation would have to be observed. For one thing, papers had to be filled out before traffic could enter the yards. The American colonel explained that, temporarily at least, that business would have to be done away with. The Frenchman protested that it always had been done.

The American stated that thirty trains were on the track behind him and that they could not stop for paper work . "Thirty trains," the Frenchman replied, "why it is impossible! They would jam the yards and block the lines!" However, the colonel told him not to worry, and the civilian went back to his tower to watch the delivery of thirty trains a day, as had been ordered.

The importance the Allies attached to having proper port facilities near the battlefield, and the eagerness of the Germans to deny them that basic necessity for maximum war efficiency was shown in the bitter struggle for Antwerp, one of the world's leading ports. From October 1 to November 6 the main effort of the Allied armies was directed toward clearing the Scheldt Estuary and opening the port of Antwerp. The subsequent German counteroffensive was directed toward breaking through to the coast, recovering Antwerp and forcing the Americans to continue to support their armies on a shoestring from Cherbourg. In effect, therefore, the German counteroffensive of December 16 was a blow at communications, as the key to the struggle.

The difference between Cherbourg and Antwerp as supply ports is shown by the fact that almost four times as much effort was required to support one division from Cherbourg as from Antwerp. If reserve supplies were included, Cherbourg could support a maximum of only 13 divisions, while Antwerp could support 50.

The original British plan for the Channel ports had allotted Brest and Le Havre permanently to the Americans, and Antwerp and Rotterdam to the British. However, partly because of the insistence of the Commanding General of the SOS, that allotment was abandoned. Antwerp, therefore, was finally shared between the two, the Americans having 22,500 tons per day as their allotted portions, and the British 17,000.

The Engineer, Quartermaster, Signal Corps, Transportation and other troops found a new challenge to their skill and courage in Antwerp, and again proved their worth. The highest order of planning, organization and coordination was necessary in order to use the great port fully despite the destruction inflicted upon its outflow lines of rail, highway and canal communications.

Entirely apart from their high-pressure work in connection with the supplies which came into that port, the Transportation and other SOS troops at Antwerp faced the danger of flying bombs, which came in during January and February at an average of about forty per day. Those bombs ranged up to two tons in weight and killed hundreds of workers, but the work went on at top speed.

The difference between the transportation problem in World War I and World War II stands out in a comparison of the most dramatic troop movement episodes in each of the two wars.

In 1914, in 36 hours, beginning September 6, 1914, in the famous "*Taxis de la Marne*" movement of 4,985 troops, a distance of 28 miles was covered by 1,200 Paris taxicabs. No supplies were moved with the troops.

Between December 18, 1944, and January 6, 1945, the Motor Transport Service of the Transportation Corps, at the height of the crisis of the German counterthrust near Bastogne, transported 67,236 troops and 10,800 tons of supplies an average distance of 100 miles from the Mourmelon district to the vicinity of Bastogne. That work was done by only 220 two-and-a-half ton trucks and 162 ten-ton semi-trailers. The success of that movement played a large part in putting the finishing touches to the smashing of the German assault.

With the opening of the ports of Le Havre, Rouen, Antwerp, and Ghent, the supply operations in support of the forces preparing for the drive into Germany

began to lose some of their shoestring aspects. Through these ports, and through Cherbourg, flowed a steady and ever-increasing volume of the matériel necessary to support a great offensive.

Because of its position at the hub of an extensive rail net serving most of northwestern Europe, Liège in Belgium became the principal collecting point for this huge influx of war matériel. Although for a time they were seriously threatened by the German counteroffensive, the stockpiles in the Liège area continued to grow, and men and supplies in increasing numbers passed through this center headed for the front. In the month of February 1945, the yards at Liège handled 35,000 tons daily.

March saw tonnage figures mount as the Army railroaders made extra effort to fill the dumps and keep supplies moving on the heels of the advance into Germany, by then well under way. Twenty-four hours before the official crossing of the Rhine on March 23, the 708th Grand Division handled and delivered to the Armies, among other things, 492 cars of ammunition, 130 cars of POL, 460 cars of Engineer bridging equipment, 765 cars of Quartermaster and Ordnance equipment and supplies, 80 cars of jerricans, and 16 cars of mail. In addition, the Grand Division handled eight troop trains.

The "Toot Sweet Express," the new freight train running from Cherbourg to the forward areas, moved 3,099 tons on 240 cars from the 12th to the 18th of February. Of that total 1,555 tons were transported on 124 cars to Verdun, while 1,544 tons on 116 cars went to the great dumps in the Liège area.

The Motor Transport Division of the Transportation Corps also had a big share in the Rhine crossing build-up. Altogether 2,796,746 tons of supplies and 1,011,774 soldiers moved over the military highways to forward areas from February 11 to March 11. To move so much material the Motor Transport Division converted many trucks from 2½ ton vehicles to heavier and more practical 10-ton and 12½-ton semi-trailers and 45-ton trailers. These Diesel-powered vehicles hauled anything from rations to locomotives.

LCVPs, tracked landing vehicles, sea-mules, and LCMs were hauled from the ports to the crossing sites on tank transporters. Harbor craft companies accompanied much of this equipment, to assist in getting bridges across the Rhine and to conduct ferrying and mine patrol operations.

The work of the Transportation Corps in support of the final push into Germany contributed greatly to the successful crossing of the Rhine at many points, with the advantage of plentiful supplies—rations, fuel, ammunition, spare parts.

56

Division-Level Logistical Support in the Battle of Schmidt

Introduction. Maj. John W. Wothe provides a detailed look at logistical support at the "user" level in the European Theater in World War II by examining the logistical operations in support of the 28th Infantry Division in the well-known Battle of Schmidt, long a subject of analysis by students at the U.S. Army Command and General Staff College. He concludes by noting that "The 28th Infantry Division's battle at Schmidt shows how logistics can affect a battle when the appropriate support cannot be provided at the proper time and place for accomplishment of the mission."

The Allies planned the 6 June 1944 invasion of Europe for years before D-day actually arrived. Detailed planning included post invasion requirements to support eastward operations. Large, unforeseen tactical successes by the Allies and the resulting fast-moving warfare ultimately ended, however, in inadequate logistical support. Tactical operations were reduced drastically until supply stocks could be built up sufficiently to support additional offensive efforts.

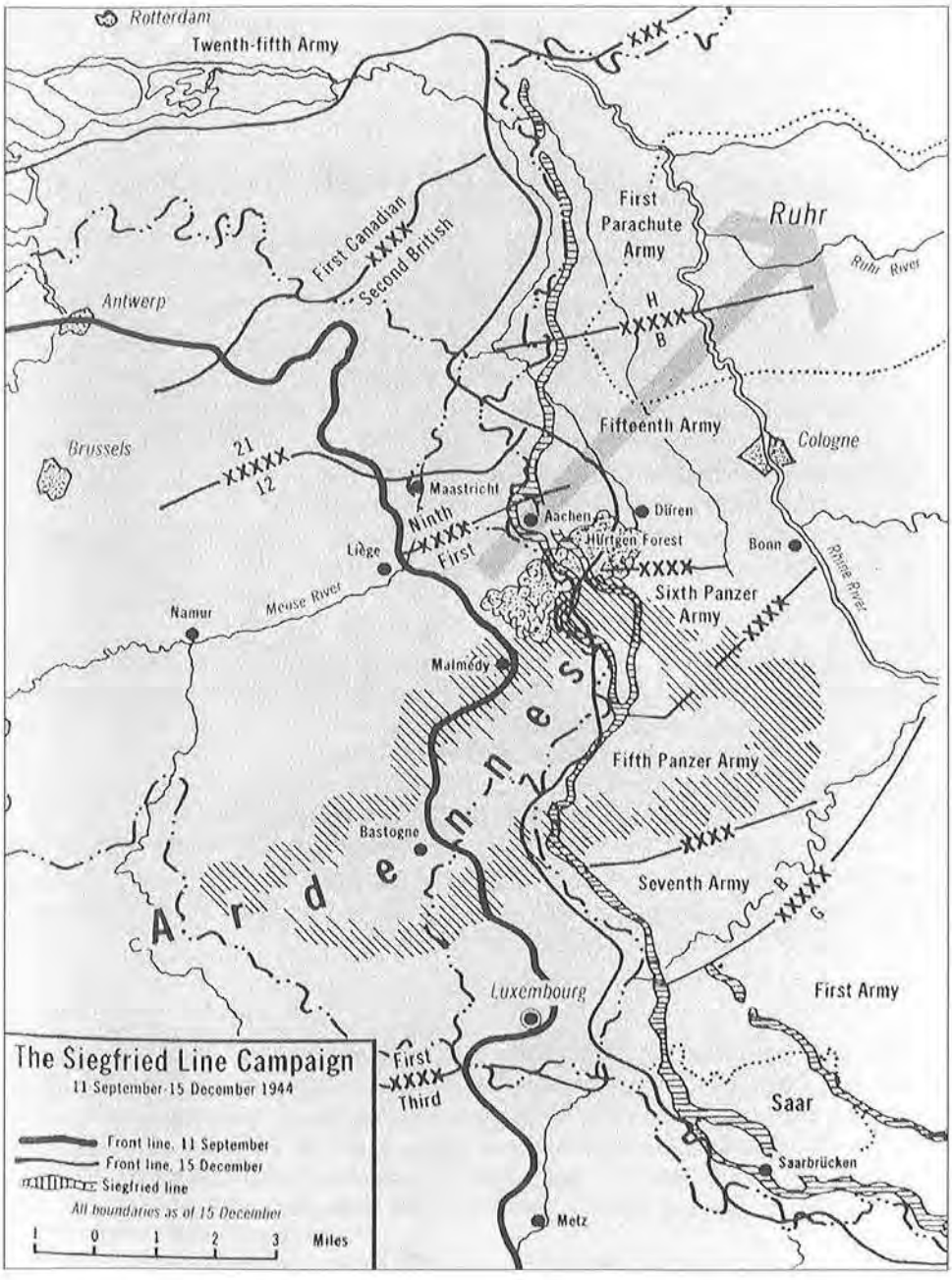
The 28th Infantry Division, at the 2–10 November 1944 Battle of Schmidt, Germany, provides a microcosm of the logistical status of front-line Army units during that period. After a brief look at the strategy and tactics involved, this article will examine the logistics of the battle.

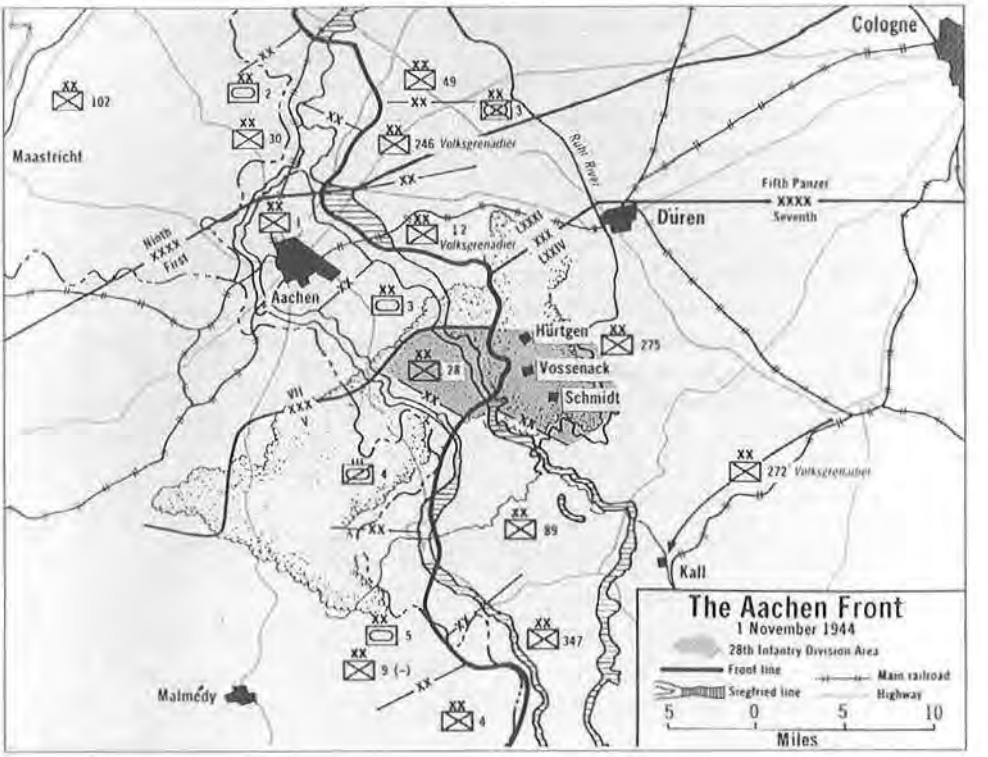
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The purpose of the operation was to gain maneuver space and supply routes, protect VII Corps' flank and draw enemy reserves away from the VII Corps area. An envelopment to the southwest was to follow the initial victories. The V Corps tactical scheme called for the division's attack to be the only action while other units held their lines. Since no other battle would take place in the area, V Corps would be able to provide ample supporting units. For example, eight artillery bat-

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Rotterdam
Twenth-fifth Army
XXX
First Canadian
XXXX
Second British
Antwerp
First
Parachute
Army
Ruhr
Ruhr River
H
XXXXX
B
Brussels
21
XXXXX
12
Fifteenth Army
Cologne
Maastricht
Aachen
Düren
Ninth
XXXX
First
Liège
Hürtgen Forest
Bonn
XXXX
Sixth Panzer
Army
Rhine River
Namur
Meuse River
XXXX
Malmédy
Fifth Panzer Army
Bastogne
XXXX
Seventh Army
B
XXXXX
G
Luxembourg
First Army
First
XXXX
Third
Saar
Saarbrücken
Metz
The Siegfried Line Campaign
11 September-15 December 1944
Front line, 11 September
Front line, 15 December
Siegfried line
All boundaries as of 15 December
1 0 1 2 3 Miles



talions and one battery would provide direct and general support fires while six VII Corps battalions fired preparatory fires. [1]

The division fought the battle in cold, close-to-freezing weather. Heavy mist often changed to rain or snow. Strong winds made the conditions even more miserable. Mud choked the roads, slowing vehicles and infantry alike.

The division's southern attack halted quickly. The attack toward Schmidt was forced to go through Vossenack. Schmidt, the major objective, fell to US control on 3 November. The terrain and one small, unpaved trail across the Kall River made it extremely difficult for the division to resupply and reinforce the troops in Schmidt. Engineers had been directed to open and secure the lone trail. However, they proved to be too slow and lacked adequate security. On 4 November, the Germans forced the Americans out of Schmidt. Both sides fired huge quantities of artillery ammunition during this period. Within a week, US forces withdrew north of the Kall River.

The environment dictated soldier morale. The wet, cold weather, endless mud and heavy artillery fire affected the US soldiers. Twice, at Kommerscheidt and Vossenack, troops quickly retreated in disarray, throwing away their equipment.

An examination of the division's Schmidt offensive reveals actual conditions and the effects of logistics on the tactical situation. Key logistical problems occurred in ammunition, forward resupply of Schmidt and Kommerscheidt, and equipping of

soldiers for winter combat. The division failed to overcome these problems completely and produced varying results that affected the tactical situation.

Sufficient fuel was available for the division's low needs. A V Corps maintenance inspection in October declared the division to be "excellent."[2] Maintenance problems occurred primarily along the Kall trail. Without security, "fixing far forward" under fire proved to be unworkable. Thrown tracks and other mechanical problems halted movement along the narrow, steep trail. Some brave mechanics and other soldiers risked their well-being in order to repair vehicles. Tank personnel felt that maintenance vehicles should be brought forward. However, this was prevented by the tactical situation and road conditions .[3]

Availability of ammunition probably influenced the battle. Since the road network was poor, First Army allowed ammunition in excess of unit basic loads to be stockpiled at artillery positions .[4] The division was permitted to increase its ammunition basic load by 50 percent. First Army closely controlled certain types of mortar and artillery ammunition that were in short supply. The division received most of the V Corps allocation as [shown below].

V CORPS AMMUNITION ALLOCATIONS TO 28TH DIVISION*

Dates	60mm Mortar	81mm Mortar	105mm Howitzer
2–5 November	15,100 (101 percent)	13,308 (114 percent)	2,158 (114 percent)
6–10 November	10,500 (70 percent)	10,080 (85 percent)	1,790 (84 percent)

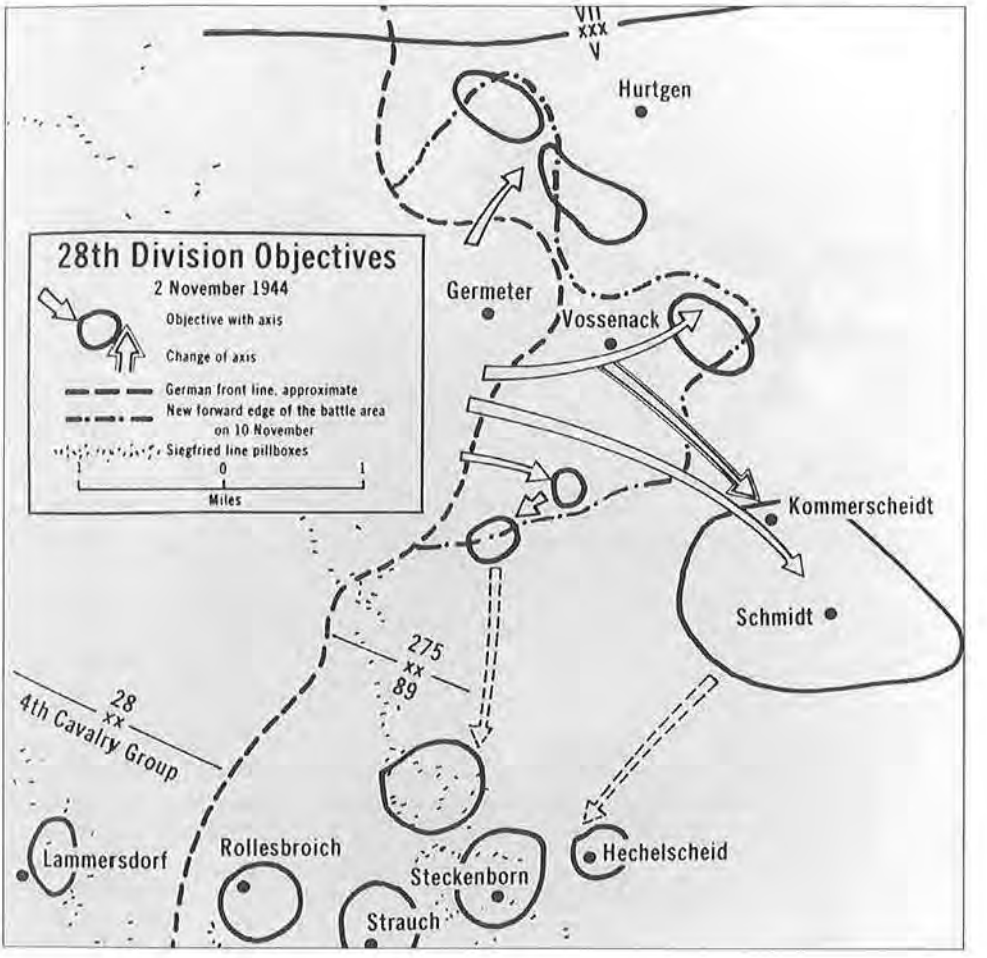
*"G–4 Operations Journal File, Nov 1944," V Corps, Department of the Army, tabs 149, 150, 153 and 155

Additionally, V Corps restricted its other divisions from firing M3, 105mm howitzer and all types of 81mm mortar ammunition. This ammunition could be fired only in "dire emergency" when other weapons would not do the job. Use had to be justified in writing within 24 hours.[5] Tanks and tank destroyers were used in the indirect-fire role since ample ammunition resupply was available for these weapons. The division and supporting units used huge quantities of artillery ammunition.

Most after-action reports and other statements indicate a limited, but adequate, ammunition status. However, the question remains: Was adequate ammunition available? One report cited critical reductions in counterbattery fires.[6] As a result of not adequately suppressing enemy artillery, did our shell-shocked troops panic easily and run?

Witnesses wrote of smoke from burning homes and the thick, white dust around air blasts and shell bursts.[7] However, no one mentioned the use of smoke ammunition. At several locations, including the southern attack and the Kall trail, the division's actions slowed or stopped because soldiers were pinned down. Where were the smoke operations which could have facilitated the attack? V Corps ammunition allocation messages failed to provide any smoke rounds.

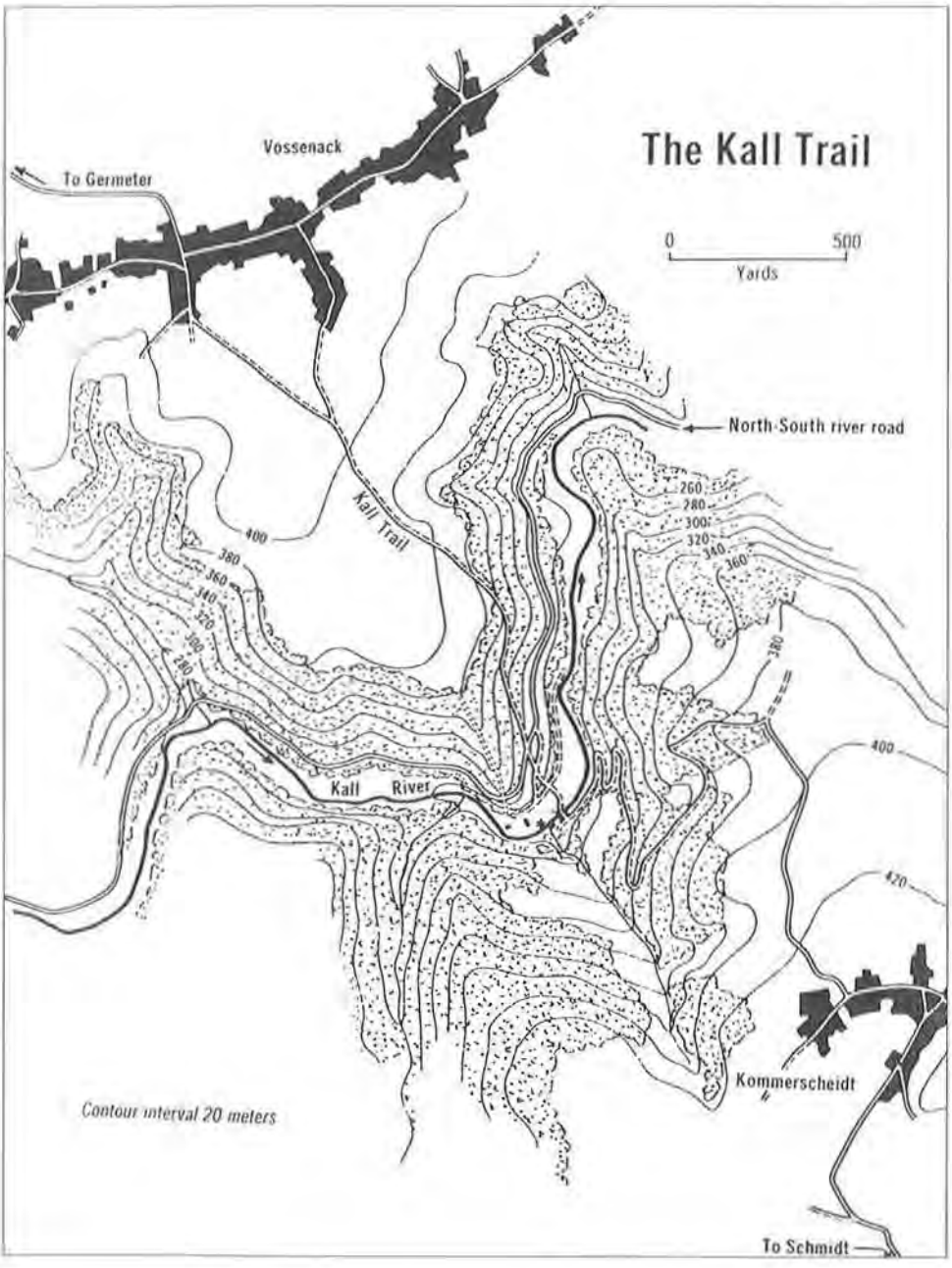
Instead, the directives stated that "emergency expenditures of shell, smoke, WP (white phosphorous), for 105mm howitzers must be made from basic load." This meant that smoke rounds that were used would not be replaced in the near future. As part of the ammunition shown in Figure 5, the division received 3,540 81mm mortar and 110 105mm howitzer white phosphorous rounds for the first four days of the



battle.[8] While these white phosphorous rounds could cause fires and provide some limited smoke, they were not as effective as rounds designed to produce smoke.

The area's poor network of narrow, muddy trails forced the division to take several actions. Additional engineer units repaired roads. Use of horses was rejected because available pack saddles were incomplete. At the division's request, it received temporary loan of 47 M29 cargo carriers, a tracked vehicle known as the *Weasel*, to aid resupply and medical evacuation in areas that could not be reached by wheeled vehicles.

The *Weasels* proved to be very satisfactory. However, the lack of training and experience of the infantrymen who had to operate them caused problems. Lacking a direct main supply route and needing to conserve fuel and vehicles, the division received support from VII Corps units. Every available truck was used to haul ammunition through the mud to artillery units. Disabled vehicles hindered resupply. Although a bother, this did not delay or prevent artillery operations.[9]


The Kall Trail
0
500
Yards
Vossenack
To Germeter
North-South river road
Kall Trail
Kall River
Kommerscheidt
To Schmidt
Contour interval 20 meters
260
280
300
320
340
360
380
400
420

The division failed to establish an adequate, secure resupply route to its forward units in the Schmidt/Kommerscheidt area. A wartime map, scale 1-to-100,000, which noted it was "not based on reconnaissance," placed the Kall trail in the category of "other roads and cart tracks. Not always motorable."[10]

Only two engineer companies from the four available battalions worked on the road. The engineers were slow, working with picks and shovels instead of heavy equipment and munitions. They failed to understand the importance of the trail. Disabled tanks soon cluttered the trail, intensifying the problem.

During this period, front-line units in combat required water, radio batteries, dry socks and ammunition from resupply vehicles which usually arrived during darkness. The condition and security of the Kall trail hindered resupply. Although limited resupply took place by means of three to five *Weasels* or trucks or by backpack on 3, 4 and 7 November, troops on the other side of the Kall River could not count on resupply. Enemy troops easily infiltrated the trail. Battalions sent out resupply missions which often had to turn back. The ammunition supply at Kommerscheidt became critical.[11]

Even when supplies were delivered, the forward units many times failed to make proper use of them. One unit in Schmidt neglected newly received ammunition while the supply sergeant delivered C-rations, mail and chocolate cake to men in their positions.[12] The positioning of a resupply area directly in front of an aid station in Kommerscheidt proved to be disastrous to patients and medics since the crowd awaiting supplies attracted enemy artillery fire.[13] All this affected the tactical capability and morale of the troops in exposed positions south of the Kall River.

Logistical reports during the October and November period, which generally claimed the situation to be "satisfactory," identified few shortages. The division indicated a need for only antifreeze and overshoes. Other sources indicate that additional supply shortages existed as well in field jackets, raincoats, canvas leggings, lightweight oil, parts and assemblies.

The attached tank battalions began the operation with only 50 tanks. Shortages reduced all V Corps tank battalions to less than their normal 54 tanks.

The division did not have adequate materiel for winter warfare. Needed were 9,000 to 9,500 pairs of arctic overshoes, sizes 10 to 15. A lack of protective footgear was seriously endangering the health of those in the command.[14] Only about 10 to 15 men per infantry company had feet small enough to fit the available overshoes.[15] Keeping feet dry in the rain, snow and mud proved to be an impossible task. High casualties resulted from immersion foot.[16]

Other personal equipment shortages included field jackets in sizes 34 regular and 36 regular, field shoes in wide widths, 6,000 canvas leggings, winter combat jackets, raincoats and wool, olive drab shirts and trousers in small sizes. Additionally, one and two-burner stoves which soldiers used to heat their rations (and hopefully to get warm) were in short supply. V Corps considered the burners necessary for troops in combat and essential for combat efficiency.[17]

Today, we can only speculate about the impact of these shortages on the soldiers. Undoubtedly, equipment shortages, combined with miserable weather con-

ditions and intense enemy artillery fire, had great effect on the troops. Certainly, their tendency to not want to fight increased.

Shortages in antifreeze and lightweight oil, SAE10, delayed completion of vehicle winterization. Several tank destroyers froze.[18] The division and V Corps were concerned about such shortages before the battle. However, the impact could not have been great in this infantry unit.

Shortages existed in tires, tubes, tube hot patches, batteries, tools, parts and assemblies for 2½-ton trucks. The latter included differentials and engines, as well as tires and tubes. The tire and tube problems forced rationing. In order to replace some sizes of tires and tubes, certificates were required stating that a vehicle was either deadlined or had no spare tire. Organization spares were not filled.[19]

Medical problems included frostbite and transportation of wounded. Frostbite resulted partially from shortages of individual equipment already discussed. Medics provided good support under the circumstances. They used ambulances, medical *Weasels* and returning supply vehicles to move wounded to the rear. However, vehicles were not always available for use. The division left many "unwalking" wounded behind during the retrograde from Kommerscheidt back across the Kall River. The V Corps surgeon sent 110 medical replacements and three ambulances with drivers to assist.[20]

On the German side, the strong defense involved logistics. Schmidt controlled the main supply route southwest to Lammersdorf. The Germans also hoped to use the Düren-Hurtgen road during inclement weather as a supply route for the planned Ardennes offensive.[21]

During the battle, the division suffered substantial losses of major equipment: 62 percent of its tanks, 67 percent of its tank destroyers and 47 percent of its borrowed *Weasels*.[22] Additionally, the division lost large quantities of rifles, automatic rifles, bayonets, machine guns, mortars, grenade launchers and rocket launchers.

Logistics played a key role in the Battle of Schmidt from start to finish. Shortages in smoke ammunition and troop welfare items may have determined the course of the battle. The almost nonexistent main supply route for the leading regiment, the Kall trail, influenced the final outcome. The 28th Infantry Division's battle at Schmidt shows how logistics can affect a battle when the appropriate support cannot be provided at the proper time and place for accomplishment of the mission.

Notes

[1] Charles S. MacDonald, *The Siegfried Line Campaign*, Department of the Army, Washington, D.C., 1963, p 343.

[2] "G–4 Operations Journal File, Nov. 1944," V Corps, Department of the Army, tab 152.

[3] Lieutenant Colonel Carey A. Clark et al., *Armor in the Hurtgen Forest*, US Armor School, Fort Knox, Ky., 1949, p 62.

[4] "After Action Report, Nov 1944," V Corps, Department of the Army, tab 128, p 1.

[5] "G–4 Operations Journal File, Oct 1944," V Corps, Department of the Army, tab 148.

[6] Charles B. MacDonald and Sidney T. Mathews, *Three Battles: Arnaville, Alluzzo, and Schmidt*, Department of the Army, Washington, D.C., 1952, p 369.

[7] Harold Denny, "Schmidt Blasted to Ruin After Foe Retakes Hamlet," *The New York Times*, 5 November 1944, pp 1 and 3.

[8] "G–4 Operations Journal File, Nov 1944," *op. cit.*, tabs 149 and 153.

[9] Jack Colbaugh, *The Bloody Patch*, Vantage Press, N.Y., 1973, pp 82–85.

[10] Clark et al., *op. cit.*, p xvi.

[11] George A. Kohutka, "Schmidt, 1944," *Armor*, September–October 1965, p 21.

[12] "Poor Staff Leadership," Report Number 1820, Army Services Forces, Department of the Army, 7 August 1945, p 5; and Second Lieutenant Charles Fower et al., *3rd Battalion, 112th Infantry History, July 1944–April 1945*, 3d Battalion, 112th Infantry, Germany, 1945.

[13] MacDonald and Mathews, *op. cit.*, p 331.

[14] "After Action Report, Nov 1944," *op. cit.*, tab 128

[15] MacDonald, *op. cit.*, p 386.

[16] "Unit Report #5, From 010001 Nov 44 to 302400 Nov 44," 28th Infantry Division, Department of the Army, p 28.

[17] "G–4 Operations Journal File, Oct 1944," *op. cit.*, tabs 132 and 139.

[18] "Lesson Plan for P312/9—The Battle of Schmidt," US Army Command and General Staff College, Fort Leavenworth, Kan., 1978, p L7–15.

[19] "G–4 Operations Journal File, Nov 1944," *op. cit.*, tab 151.

[20] "Unit Report #5, From 010001 Nov 44 to 302400 Nov 44," *op. cit.*, p 27.

[21] "Lesson Plan for P312/9—The Battle of Schmidt," op. cit., p LP7–4–A–17. This quotes German General Baron von Gersdort.

[22] MacDonald and Mathews, *op. cit.*, p 415; and "Unit Report #5, From 010001 Nov 44 to 302400 Nov 44," *op. cit.*, p 28.

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The Division Slice in Two World Wars

Introduction. Col. Carl T. Schmidt, an instructor at the Army War College, compares the proportional allocation of military manpower to combat and support tasks in World War II to the situation in World War I. He notes how worldwide operations on land, sea, and in the air, the complexity and density of equipment, and the overall magnitude of Army operations in World War II required that a relatively high percentage of manpower be dedicated to producing and distributing the means of war rather than actually using them against the enemy.

When Germany surrendered, on 7 May 1945, the United States had some 12 million men in its armed forces. Less than one-fifth of these men were in ground combat units. All of the 89 Army divisions then in existence, and all of the divisions of the Marine Corps, were in overseas theaters of operations, and all but 2 had been in action. No reserves, other than replacements, remained in the United States; nor was there any significant strategic reserve of uncommitted forces in the theaters. For some time, too, the problem of supplying trained replacements to the combat divisions had been critical.

One interpretation of these facts is that our mobilization plans provided with remarkable accuracy for the minimum forces required to win the war. It also may be said that, had our operational plans suffered a serious check, we would have paid dearly for our shortage of combat divisions.

Certainly, we could have made good use of more than 89 divisions. Several advantages would have followed from a larger number. One would have been the ability to withdraw units from action before the point of fatigue had set in, and beyond which casualties tended to mount seriously. Another would have been more systematic unit training, without the disruption and turnover within units caused by emergency demands for individual replacements. A third would have been greater ability to concentrate decisive force at critical moments.

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But could the United States have mobilized, fought, and supported more divisions without seriously reducing the strength and quality of its over-all strategic effort? Were there wastes of manpower, the correction of which would have added to our fighting strength? Is this country's capacity to deploy combat divisions overseas as limited as it appeared to be in World War II? These questions are of more than historical interest, for the proper utilization of American manpower, in a future war, has become a problem of utmost importance.

One approach to the answer is by way of history. We may compare the employment of manpower and the division slices of the American Army in World Wars I and II, determine points of difference, and establish reasons for the differences. Such an analysis may point to lessons that have an application to the future. This is the approach taken by the present article.

Analysis of Division Slices in the Two Wars

Number and strength of divisions.—By 11 November 1918, the Army had activated 58 divisions. Of these units, 42 were overseas. However, 12 of the 42 divisions were not functioning as combat units, having been drained for replacements or converted to other uses in France. Of the 16 divisions forming in the United States, 9 were at less than half strength in November 1918. The total strength of the Army (less personnel in the Air Service and related activities) on 11 November was 3,514,137 men. Of this number, 933,862 men were in divisions.

On 30 April 1945, the Army contained 89 divisions (67 infantry divisions, 16 armored divisions, 5 airborne divisions, and 1 mountain division). All were overseas, and all were at or not far below their authorized strength. The total number of men in the Army (less Army Air Forces) at the end of April was 5,983,492, of whom 1,194,569 were in divisions.

Effective division slices.—Obviously, we would be led to false conclusions if we were to use the total numbers of *activated* divisions in the two wars as the basis for calculating the respective division slices. It is more reasonable to determine the number of divisions that would have existed if all divisional personnel had been assigned to such units at maximum authorized strength. On 11 November 1918, the table of organization strength of an infantry division was 28,059. Therefore, the total of 933,862 men then in divisions was equal to 33.3 *World War I* full strength infantry divisions. Similarly, on 30 April 1945, the authorized strength of an infantry division was 14,037. The total of 1,194,569 men then in divisions was equal to 85.3 *World War II* full strength infantry divisions.

On this basis, the world-wide division slice of World War I was 105,000 men, and that of World War II was 70,000.

Equivalent division slices.—It is apparent that these slices also are faulty for purposes of comparison because the World War I infantry division at authorized strength had twice as many men as the infantry division of World War II. Therefore, a further adjustment is necessary if we are to have a valid basis for comparison. Based on this adjustment, we can calculate the number of "equivalent divisions" on the two dates in terms of a *single* authorized strength. If we apply the 1945 strength

of 14,037 men to the personnel in the divisions on 11 November 1918, we find that the 58 activated divisions of World War I were equivalent in manpower to 66.7 World War II infantry divisions. In these terms, the world-wide division slice in 1918 was 52,600 men, as against a world-wide division slice of 70,000 in 1945.

Distribution of personnel.—A more illuminating approach to a comparison of the relative numbers of combat troops in the two wars is the distribution of personnel in the Army by major categories.

Division slices in comparable theaters.—It also is interesting to contrast the division slices of 1918 and 1945 in approximately the same theaters of operations, that is, Western Europe. In the American Expeditionary Forces, the slice, in terms of a division equivalent in manpower to a World War II infantry division, was 39,000 men. The comparable slice in the European Theater of Operations was 45,000 men.

DISTRIBUTION OF PERSONNEL IN THE ARMY IN TWO WORLD WARS

	Total Strength		*Percent of Total Army (less Air)*		*Percent of Total Ground Combat Forces*	
	15 Nov 18	*30 Nov 45*	*1918*	*1945*	*1918*	*1945*
Divisions	933,862	1,194,569	26.6	20.0	56.3	53.5
Nondivisional combat forces (less antiaircraft artillery)	726,149	779,882	20.7	13.0	43.7	35.0
Ground combat forces (less antiaircraft artillery)	1,660,011	1,974,451	47.3	33.0	100.0	88.5
Antiaircraft artillery		259,403		4.3		11.5
Total ground combat forces	1,660,011	2,233,854	47.3	37.3	100.0	100.0
Nondivisional service	945,470	1,638,214	26.7	27.4	56.9	73.3
Replacements	454,863	841,715	13.0	14.1	27.4	37.9
Overhead and miscellaneous	453,793	1,269,709	13.0	21.2	27.4	56.9
Total Army (less Air)	3,514,137	5,983,492	100.0	100.0		
Army Air Forces	190,493	2,307,501				
Total	3,704,630	8,290,993				

*Interpretations**

For our purposes, the data presented above have the following significance (consideration is given only to the Army minus Air Force personnel):

1. In 1918, almost half the Army was in *combat categories*; in 1945, only a little over a third.

2. Personnel classifiable as *replacements* numbered somewhat over a quarter of the Army in both wars. However, they were considerably higher in proportion to combat troops in 1945 than in 1918.

*The data in the table found [above] and the material on which "Interpretations" are based are found on pages 191–193 inclusive of *The Army Ground Forces: The Organization of Ground Combat Troops*, published by the Historical Division, Department of the Army, in 1947.

3. Personnel in *service categories* numbered somewhat over a quarter of the Army in both wars. Service personnel also were considerably higher in proportion to combat troops in 1945 than in 1918.

4. Personnel in *overhead and miscellaneous categories* were proportionately much higher in 1945 than in 1918.

5. Aviation drew more heavily on services of the rest of the Army in 1918 than in 1945. Therefore, the division slice of 1945 is *not* disproportionately weighed by support for the Air Forces.

6. The proportion of personnel in the Army whose job was to support troops in divisions was *45 percent* greater in 1945 than in 1918, that is, for every 100 men in a division, the number of men in support was 276, in 1918, and 400, in 1945.

Combat Capabilities of Infantry Divisions in 1918 and 1945

Was the increased support given to the combat division of World War II accompanied by greater power on the battlefield?

The essence of success in tactics is the delivery of overpowering fire from the right place at the right time. Two ingredients in this essence are fire power and mobility. There are other elements, notably leadership and the will-to-fight, but they cannot be measured arithmetically. The relative fire power and mobility of tactical units, however, can be calculated with a tolerable approximation.

Fire power.—The infantry division of 1945 not only was equipped with more effective weapons than the infantry division of 1918, but it also delivered more fire in battle. The weight of ammunition of all calibers expended, on the average, in each division day of combat in the European Theater of Operations was 2½ times greater than in the American Expeditionary Forces. This contrast is all the more striking when we recall that the infantry division of World War II had only half as many men as were authorized the division of World War I.

Mobility.—The World War I division, unless assisted by nonorganic transportation, was limited in its mobility to the rate of march of its foot soldiers. The World War II infantry division, however, was capable of moving either at the rate of march of its infantry regiments or, by employing its organic vehicles in echelons, at the much higher rate of motor trucks. In rear areas, it could move at least 7 times as far in 24 hours as could the division of 1918. In strategic mobility, the 1945 infantry division (not to mention the tactical capabilities of the armored division) was much superior to its counterpart of World War I.

The higher fire power and mobility of the divisions in World War II were a reflection both of better equipment and of greater logistical support.

Reasons for the Disparity Between Division Slices in the Two Wars

So far, two conclusions have been reached:

1. Substantially more manpower supported a given number of combat troops in World War II than in World War I.

2. The potential effectiveness of a division on the battlefield was much greater in 1945 than in 1918.

The division of 1945 had more fire power and mobility than its counterpart in 1918 because its weapons, vehicles, and signal communications were superior. These improvements, in turn, were a product of the rapid progress made in science, technology, and industry in the years between the two wars. But the new tools of war had a price: the additional manpower needed to operate and maintain them. The greater fire power and mobility of the World War II division could be achieved only by giving it increased noncombat support.

In other words, technological developments in warfare made necessary a larger division slice. It is possible that there were other reasons, too, for the growth of the noncombat elements of the Army—reasons to be found in the peculiar strategic character of World War II and in the impact of American standards of living upon the military service.

The factor of technology.—We may consider first the matériel requirements that reflected technical developments in the art of war. This is a factor that would have operated regardless of the particular strategy of World War II. The point is this: Because of innovations in warfare, the tools used by the Army in World War II were very different from those used 25 years before. These requirements were expressed not only in an increase in the numbers and types of items of equipment, but also in increased bulk and mechanical refinement of much of that matériel.

The initial movement of one American soldier with his equipment in World War I required an average of 2.7 measurement tons. The comparable figure for World War II was more than 5 tons. Furthermore, an average ton of matériel for the American Expeditionary Forces took up 63 cubic feet of space; for the United States Army in the European Theater of Operations 99 cubic feet was required. In short, 57 percent more space for each ton in storage and transportation was needed in the European Theater of Operations than in the American Expeditionary Forces. Supply requirements of the American Expeditionary Forces averaged 59 pounds for each man each day; in the European Theater of Operations they averaged 67 pounds. The relative mechanization of the two forces is reflected in the fact that the consumption of gasoline for aviation and all other purposes in the American Expeditionary Forces was a little over 1 pound for each man each day, whereas in the European Theater of Operations it was more than 11 pounds for nonaviation purposes alone.

As we have seen, an infantry division in 1918 had an authorized strength of 28,059 men. An infantry division in 1945 had half that strength. Yet the armament requirements were almost in reverse proportion. The 1918 division had 86 artillery pieces, whereas the 1945 infantry division included 136 artillery weapons. The division of 1918 had 260 machine guns. With half as many men, the 1945 division was equipped with 461 machine guns. In World War I, a division had 804 motor vehicles and 1,080 carts and wagons. An infantry division in World War II had 1,474 motor vehicles. In World War I, there was no armored division. The *total* number of tanks employed by the American Expeditionary Forces was 265. (Most of these were 6-ton tanks; all were furnished by the French and British.) In World

War II, an armored division was equipped with 2,053 self-propelled vehicles, including 272 tanks.

The increased volume, variety, and complexity of the tools of war were accompanied by greater volume, variety, and complexity in the supply of the tools, the ammunition and fuel required for their operation, as well as in their transportation, storage, and maintenance. Therefore, the factor of technology alone demanded more manpower for the support of a combat unit.

The factor of strategy.—There also was a major strategic difference between the two wars. This difference inevitably was reflected in the relative sizes of the division slices.

So far as the American Army was concerned, World War I was confined to a relatively narrow front in one major theater of operations. The strategic problem was to move a large, partly equipped army across a single ocean line of communications into a relatively secure and well-organized base; there to assemble and complete the training and equipping of the army; and, finally, to join with strong Allied armies in defeating the enemy upon a single front, primarily by means of infantry and artillery.

The problems of World War II were much more complex. Our strategy in that war was to hold at least one of two major enemies at bay, while gathering our strength for offensive action, and then, because we were unable to attack both opponents in force at once, to give priority to the defeat of the more formidable. The holding phase of our strategy required the provision of great logistic aid to our Allies, the securing of numerous lines of communications, and a preliminary offensive against the enemies' logistic potentials, primarily by means of air and naval action. The second phase of our strategy was executed when our men were trained and equipped, and we were able to bring to bear preponderant weight in matériel. We then launched major amphibious and air offensives designed to seize and secure bases in enemy-held areas, first, in Africa and Europe, and, later, in the Pacific. Once these major bases had been secured, it was necessary further to assemble large armies for the final offensive toward the enemy homelands.

To say that the American Army's strategic problem in World War I was comparatively simple is not to deprecate the skill with which it was solved. It does lead one to expect that a smaller proportion of the Army's manpower had to be committed to noncombat duties than was required by the more complex and more widely deployed operations of World War II.

The factor of lines of communications and sources of supply.—In World War II, the Army was confronted by a logistical situation different, in important respects, from that of the earlier war. These differences—in part an expression of technological developments and strategy—also must be considered in an analysis of the support required by combat units.

Not only were our troops in World War II more highly mechanized and, in part, more distantly deployed than in 1918, but they also received less logistical help from their Allies.

Only 43 percent of the 2 million men in the American Expeditionary Forces were shipped overseas in American vessels. However, most of the 5 million sol-

diers overseas at the end of World War II, and virtually all of their supplies, were transported in American ships. In 1917–18, there was but one overseas theater, 3,000 miles from American seaports. At the European terminus were well-developed ports, far from the front and unharassed by the enemy. The unloading of men and supplies proceeded without serious interruption. The troops were moved toward the front over a secure railway system, operated, in large part, by French personnel and equipment. In World War II, our troops were transported to five major theaters, in Europe and Africa, Southeast Asia, and the Western and Southwestern Pacific. Instead of only 3,000 miles, men and supplies were sent 6,000 miles to the South Pacific and even 12,000 miles to the ports of India and the Persian Gulf. Many of the overseas ports were inadequate, or were badly damaged. In some instances, no ports were available; major assaults were made against defended shores in order to seize harbors and repair them with our own means. Ashore, the troops moved largely with their own transportation.

For its supplies, the American Expeditionary Forces drew, to a large extent, upon the British and French. On a tonnage basis, 51 percent of all supplies received by the American Expeditionary Forces from 1917 to 1919 came from Europe, and only 49 percent from the United States. For particular equipment, notably artillery and aircraft, the Army depended almost entirely upon British and French sources. By the spring of 1918, the Armies of France and Great Britain had suffered very heavy casualties. At this point, America's contribution to the Allied cause became primarily one of manpower. In 7 months, 1½ million American soldiers were shipped to France, there to be supplied, in great part, by our Allies.

The American Expeditionary Forces were handicapped seriously by not having enough service support for their combat units. The shortage of service troops became more and more acute in the last months of the war. In September 1918, it was decided to turn over to the Services of Supply three newly arrived infantry divisions, pending the arrival of more Services of Supply troops. In other words, the division slice of the American Expeditionary Forces was probably too small.

By contrast, the much heavier supply requirements of the American Army in World War II were met far more completely by its own logistical services. Moreover, the Army made large material contributions to the Allied armed forces and to the civilian populations overseas. For example, almost all of the equipment used by the revitalized French Army, which had 12 divisions in action at the end of the war, was supplied by the American Army. Our forces operated lines of communications in Persia and India for the sole purpose of sending supplies to the Russians and Chinese. The Army also was obliged to assist in maintaining a minimum subsistence for the populations of liberated and occupied areas, and this, too, burdened its service forces.

The long, complicated, and relatively insecure lines of communications of the Army in 1941–45, together with the heavy demands made upon its supply system, thus were additional reasons for the high proportion of service troops in World War II.

The factor of replacements.—We have seen that replacements were in higher ratio to combat forces in 1945 than in 1918. For every 100 men in divisions, there

were 38 replacements in May 1945, as against 27 in November 1918. This was an element of greater combat strength in the division slice of World War II.

Before World War II, it had been the practice to fight divisions until they were seriously reduced by casualties, and then withdraw them from the line and rebuild them. In 1918, the American Expeditionary Forces had to reduce the strength of its divisions and, finally, to disband several newly arrived divisions in order to maintain the limited strength of those already in battle. In contrast, the replacement system adopted by the American Army in World War II provided for a flow of individual soldiers from training centers to the divisions in combat, in order to keep those units near full strength. Losses were replaced without the dissolution of any divisions committed to action, although some of them suffered heavy and continual casualties over a period of years.

Not only were there, proportionately, more replacements in World War II than in World War I, but also they were more fully trained and their movement was conducted more systematically. The personnel required to give this training and to manage the replacement system were a sizable portion of the Army's "overhead."

The factor of living standards.—During the interval between the two wars, the American people approximately doubled their yearly per capita production of goods and services. The increase in output was accompanied by a marked rise in consumption levels. Not only did this mean greater individual consumption of the "essentials"—food, clothing, and shelter—but also more consumption of "luxuries" and near luxuries. As a result, the wants of the American people ranged more and more widely. Increasingly, the bounty of modern industry was expressed in automobiles, radios, skin creams, beard softeners, silk stockings, cigarettes, billfolds, dancing lessons, puffed cereals, and motion pictures. Not merely the luxuries of the fathers, but also luxuries unknown to the fathers, became the necessities of the children. Under the pressures of convention, at least a moderate consumption of such things came to be part of a decent living. People were caught up more and more in an elaboration of dress, diet, housing, recreation, and adornment. At the same time, habits of wasteful consumption became more widespread and firmly fixed. It was easy to recognize the many forms of waste that had become a part of the accepted living pattern. The comparative wastefulness of Americans is widely admitted by Americans themselves. It was widely regarded as a proof of the success of their productive system.

The point made here is not that this is morally reprehensible. It is simply that the rising American living standard, and its accompanying wastes, have been increasingly costly in terms of materials and manpower, and that as a result, the American habits of consumption inevitably are reflected in the standards of the armed forces of the American people.

It is difficult, statistically, to throw light on the influence of this factor in raising the manpower and material requirements of the Army of 1940–45. Yet there is no doubt that it did have a substantial effect. Everyone who knows the habits of American soldiers of all ranks, everyone who knows of the services provided systematically by the Army, can provide illustrations. There were the laundry and bath units, the refrigerated foods, the efficient postal service, and the well-made shoes

and trucks. On the other hand, there were the wasted rations, the gasoline burned in needless jeep rides, the serviceable equipment cast aside, the soft drinks shipped thousands of miles, the elaborate merchandise of the Post Exchanges (at least in the rear areas), and the mountainous baggage that was transported by our moving troops. Possibly the modern American business office—with its lavish use of paper, typewriters, files, and clerks—had its reflex, too, in swelling the demands of the higher headquarters. The American troops of 1918 were hailed by the Quartermasters as "the best fed soldiers in the world." Yet the average soldier in the American Expeditionary Forces ate only 4.3 pounds of food a day, whereas his European Theater of Operations counterpart required more than 7 pounds. The ration of 1945 was more palatable than that of 1918, but why—even allowing for convenient packaging—should it have weighed 3 pounds more?

The Army of 1918 also had a high standard of living, compared with its Allies, and its soldiers were not noted for thrift. But the pressure of civilian living habits upon the Army—the urge to duplicate the comforts and usages of civilian life was heavier in World War II, if for no other reason than because these habits were expressed on a materially higher and more lavish plane.

Inflation of the Division Slice in World War II

Was the division slice of World War II larger than can be reasonably explained by the factor of technological development and by the unique strategic and logistical requirements of the war? The discussion of living standards in the preceding paragraphs suggests that it was. The prolific demands for men and equipment to be employed in many ways not related to combat, the habit of "empire building," the tendency to burden the military establishment with comforts and conveniences, specialized services, and complex agencies of control—these were powerful forces in the inflation of noncombat elements of the Army.

Colonel S. L. A. Marshall—(in the *Combat Forces Journal* of August 1950)—pointed up certain aspects of the problem in trenchant language: "In actual goods, we wasted more matériel in Western Europe in getting from Normandy Beach to the Elbe River than the two million men of the original American Expeditionary Forces required throughout its operation. The total *requirements* of the first American Expeditionary Forces were several million tons less than the *surplus* of the second expedition of 1944–45.

". . . such tremendous waste came mainly from two faults in the system. The first is our overindulgent attitude toward our troops; we seem to feel that their loyalties cannot be commanded unless the Army acts as a pappy to them and puts their creature comforts above all else. The second was a basic weakness in the checks or controls over the supply demands of the field armies. . . . Both [evils] came . . . from the illusion that American resources are practically inexhaustible. That idea of the national wealth, and how we should use it when war comes, is by no means confined to the armed services. But to the extent that they follow this public fancy, instead of determining a fundamental soundness for their own economy, they sanction the bogging down of true mobility under insupportable weights.

* * *

"The lack of a fundamental supply discipline in all ranks of all the services causes more friction and destroys more mobility in the operations of American forces than any other weakness. And it is a chief contributor to our *moral* weakness."

Not only were there avoidable wastes of manpower and materials in the flow of supplies to the troops, but there also were wastes in the organization and operations of headquarters and of troop units.

The staffs of higher headquarters absorbed many of the most experienced officers, not to mention others who might have been more useful elsewhere. Moreover, the massive paper work, the complicated co-ordination, the network of communications, and the liaison demanded by elephantine headquarters threatened to block the rapidity of action for which the Army was physically equipped. General McNair wrote: "The overhead of headquarters in this war is viewed as staggering. We have the advantage of the most modern equipment in communications and transportation, which should operate to reduce overhead but actually is operating to increase overhead instead. . . . If commanders are allowed to indicate their own needs, experience has shown repeatedly and almost invariably that there will be no end to the increases demanded."

Duplicating supply lines and different standards of service in the Army, Navy, and the Air Forces complicated and slowed logistic operations. Intricate organizations for Army administration, services, and supply existed in the overseas theaters. Each theater commander was free to set up whatever type of logistic structure be desired. The result was that no two were alike. Large headquarters with vaguely defined and overlapping functions were the rule. Differing systems, procedures, forms, and nomenclature were barriers to effective supply coordination.

Furthermore, according to the *Final Report of the Army Service Forces*, "a fully satisfactory organization within tactical units of the Army for performing logistic functions in the field was not developed during the war. The number and types of service units, over 150 at the end of the war, is one indication of the confusion in this field. In addition, special units or units with special equipment were continuously created. There was an unnecessary overspecialization in types of service troops, thereby making it difficult to secure maximum flexibility in the utilization of service personnel."

The advantage of hindsight makes it far easier to point to such wastes today than during the war. Many activities that now appear unnecessary could not have been so regarded at one time or another while the conflict was going on. War inherently is wasteful. Nevertheless, it must be evident that a greater sense of the value of men and materials is essential to the safety of this Nation.

Lessons Applicable to a Future War

What lessons can be drawn from this comparison of division slices in the two wars? Have we found any guideposts that point the way toward reasonable reductions in the noncombat elements of Army manpower?

We have seen that a number of major factors operated toward a relatively large employment of manpower in supporting roles in the Army of 1941–45. These very features suggest approaches to the problem of deflating the noncombat categories in future war.

Technology.—For one thing, the increasing complexity of the tools of war demands more and more manpower in support of the combat troops. Some of this growing complexity adds to the battlefield potential of the Army. But it is at least possible—if not probable—that the net effect of technical developments in certain directions will reduce the Nation's fighting power. The cost of these developments—the manpower that they remove from the pool of potential fighting soldiers—may more than offset their contribution.

This possibility is raised strikingly by the trend toward motorization. To realize that there is a limit to the profitable employment of motor vehicles, we need only envisage the absurdity—in the present state of technology—of providing every man in a combat unit with a vehicle. An excess of transportation surely will immobilize an Army.

The large number of motor vehicles assigned to combat units in World War II added greatly—directly and indirectly—to the demands for shipping space and thereby reduced the number of troop units that could be sent abroad. The more vehicles were used overseas, the more shipping was needed for fuel, spare parts, replacement vehicles, drivers, and maintenance men, and the less was available for combat troops, weapons, and ammunition.

Economy of force is a basic necessity even for an Army that prides itself on the superiority of its technical resources. Let us consider any proposals for the adoption of new tools of war—or, for that matter, proposals for a wider use of existing tools—only if their benefits are evident from the broad standpoint of objectives and costs to the national war effort. These proposals must prove that the manpower and materials needed for the production, maintenance, and operation of the new tools of war would not be employed better elsewhere. They must prove their worth—not in making life more convenient or easier—but in adding directly or indirectly to the striking power of our fighting men.

Strategy.—The complexity and the wide range of American strategy in World War II also did much to swell the requirements for manpower in noncombat assignments. A multiplication of strategic commitments also is a multiplication of demands for men, especially for lines of communications. If our limited manpower is to be used for the most urgent tasks, our strategic planning must look to the concentration of force on primary objectives. Furthermore, we must devise better means of estimating long-range troop requirements and for anticipating the deployment of units. This is necessary, if logistical planners are to have a firm basis and sufficient time to furnish sound support for projected operations.

Standards of living and working.—Another lesson, perhaps the most difficult to be learned from the experience of World War II, is that the whole range of our requirements can and must be reduced in the interest of economy. No one consciously advocates waste. Our problem, however, lies in convincing men, in specific situations, that they can get along with less and be the better for it. What is

required is a fundamental change in attitudes; a change that will make for a far stricter application of economy in concrete cases. This is a problem of leadership and initiative at every level, civilian as well as military.

It is pertinent to recall the ideas of a resolute spokesman for economy in the Army. General McNair's chief thought in tactical organization was to concentrate a maximum of men and matériel in offensive striking units capable of destroying the enemy's capacity for resistance. The derivatives of this idea were many. One was to have a minimum of noncombat soldiers, to hold down nontactical overhead, and to make tactical staffs small and efficient. Headquarters companies, staffs, and administrative personnel should be kept small by the elimination of unnecessary links in the chain of command and by reduction of paper work through the use of verbal orders. Combat units should have only such personnel and equipment as they require at all times. Transport and special equipment should be assigned sparingly and pooled where possible. Weapons and units primarily defensive in character should absorb as little as possible of the national resources. Special-type units and excessively specialized personnel, useful on certain occasions only, should be discouraged.

Modern weapons and modern transportation have greatly increased the tactical potential of combat units. But the need for *more* combat units will not be met, unless we learn that American soldiers can get along with less and be the better for it. Nor does this hold only for the fighting troops. The living standards of troops in rear areas also must fall in line. Furthermore, most people probably can work harder than they do. The duty hours of front-line units can at least be equaled in the rear areas, and, especially, in headquarters.

Administrative and service troops also must be prepared to defend themselves against raids and penetrations. Economy of force argues against stationing combat units in rear areas to guard the lines of communications. All men, in the technical and administrative services, must be trained in the essentials of small unit combat as well as in their technical and administrative specialties. By the same token, administrative and service units must be organized and equipped so that they can engage in combat.

All this is not merely a matter of proclaiming doctrine based on a concept of stern supply discipline, nor of applying a red pencil to tables of organization and troop lists. It is, rather, one of devising controls and standards of inspection to make those controls work. All ranks, in all services, must weave tighter discipline into their performance of duty.

Conclusion

There were almost three times as many men in the Armed Forces of the United States in World War II as in World War I. Yet the number of men in our ground combat forces was only 50 percent greater. Furthermore, the Army division slice of 1945 was one-third larger than the comparable slice of 1918.

Several factors were responsible for the limited numbers of men in ground combat units and for the large proportion of noncombat elements in the Army

during World War II. One was the heavy allocation of manpower and materials to control the sea and the air, to engage in strategic air bombardment, and to support our Allies. Another was the requirement to secure and maintain long and difficult lines of communications. A third factor was the need for men and supplies to move, operate, and service masses of heavy and complicated mechanical equipment. There was desire and pressure to give the men in the armed forces something comparable with the American standard of living. There also was the large overhead that seemed necessary for the control of a complex of specialized units. And, throughout the process, there was, unfortunately, a great waste of manpower and materials.

Our ability to economize in these factors will determine the extent to which we can increase the relative size of our ground striking force in the future. The value and the cost of technical innovations must be assessed more carefully. Strategic commitments must be limited to those essential to the national purpose. Above all, Americans must learn that their resources are limited, and that they must work harder and live with less. Only in this way can we build more power in the men behind the guns.

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The Logistics Lessons of World War II

Introduction. This last chapter from the final report of the Army Service Forces in World War II summarizes the lessons learned in providing logistical support for the United States Army worldwide and posits that logistics will play an important role in any future conflict.

The full logistic implications of World War II must await a complete assaying of our experience. The chief lessons, however, are already apparent. The roles played by strategy and tactics, by military leadership, and by the man in combat are well known. Important and decisive as they were, they were completely dependent upon adequate logistic support. Moreover, logistic limitations in many cases dictated our strategy, as well as the type of campaign to be fought and the timing of its initiation.

Our strategy, in general, was to hold the enemy at bay while gathering our strength for offensive action and then, because we were unable, either from the standpoint of human or material logistics, to attack both at once, to give priority to the destruction of the most formidable—Germany. The holding phase of our strategy included the provision of all possible material logistic assistance to our Allies, the securing of lines of communications, and a preliminary offensive against the enemy's logistic potential by bombing his industrial plant, disrupting his lines of communications, and depriving him of raw materials. The second phase of our strategy was implemented only when our men were trained and we were able to bring to bear preponderant weight in material. We then launched the all-out assault and offensive, first in Africa and Europe, and later in the Pacific.

Ultimate victory in each Theater was assured when the quantity and quality of our weapons and equipment surpassed those of the enemy. If any indisputable logistic lesson can be drawn from World War II, it is that in any major war involving industrial powers no nation can hereafter emerge victorious without substantial and sustained superiority over its enemy in the quality and quantity of its weapons and supporting equipment.

Reproduced from United States Army Service Forces, *Logistics in World War II: Final Report of the Army Service Forces* (Washington, D.C.: Government Printing Office, 1948), pp. 244–52.

World War II compelled the United States to utilize its resources on a greater scale than ever before. Labor, industry, agriculture, transport, science, the military—all were essential to victory. All civilian activities were affected by, and most of them in varying degrees contributed to, the war effort.

Before World War II, it had been customary to consider the potential resources of the United States as practically unlimited and sufficient for any war in which this country might become involved. The demands of World War II in some respects reached the limits of our resources. There were at all times practical limitations of one kind or another upon the production of essential items of munitions. It was always necessary to balance imperatives and to readjust requirements to available resources. It is generally true that the Armed Forces were adequately supplied, but it is also true that there were many critical shortages of important items.

The controls imposed for the purpose of directing the resources of the Nation into war channels were neither as complete nor as severe as those of our Allies or the enemy. Conservation measures and many restrictions on materials and facilities for nonessential production were voluntary or only partially effective. Except by a few indirect and rather ineffective devices, we had no means of controlling industrial and agricultural manpower. Production for civilian use continued at a considerably higher level than that of either the enemy or our Allies. That we could have increased the production of munitions by means of more stringent Government controls is a certainly.

Any future major war, regardless of the weapons and tactics employed, will be even more "total" than World War II. Great quantities of old, as well as new and more intricate types of munitions, and faster and faster means for transporting military forces over great distances will be required. Measures for the protection of the United States itself against guided missiles, radioactivity, and chemical and bacteriological warfare will require huge additional expenditures of manpower and materials. Our logistic potential will be taxed to the utmost. Only the fullest utilization of our resources will assure us the best possible chance for victory.

Perhaps the most significant lesson of World War II is that the military potential of a nation is directly proportional to the Nation's logistic potential. That our resources are not unlimited is the first hard fact faced in applying that lesson. Next is that the slightest delay or inefficiency in harnessing our logistic resources may cost us victory.

America's contribution to victory in World War II was decisive because: its raw materials were relatively abundant; its basic industry was larger and more productive than the enemy's; its productive plant was beyond enemy striking power; there was time in which to produce munitions, to train our military forces, to organize our Government and economy for war. In both World Wars, we had advance warning and a period of protection by our Allies in which to mobilize our strength. No enemy will make the same mistake a third time. Our military forces, Government, and economy must be carefully and skillfully prepared for instant, complete mobilization in defense of the Nation.

Time is the most precious element in logistic preparations for security. Measures must be prepared in advance for the all-out logistic mobilization that

must be completed between the time when danger threatens and the time that war actually strikes. Our intelligence must give us adequate forewarning. Reserves of supplies and equipment, of machine tools, of munitions plants, of strategic materials, and of trained manpower must be maintained to bridge the gap between peacetime operations at the time of the warning of danger and full conversion to meet aggression. Mobilization must be rapid, efficient, and automatic so that fully trained and equipped forces, supported by the full-blast production of munitions, will be available the moment the United States is attacked. The alternative would be to create and maintain a large, active military establishment with its vast stores of munitions, and constantly to supplant, in quantity, older weapons and equipment with the latest types. This would be contrary to our national tradition, and the cost prohibitive.

It is imperative that advance plans provide for more effective organization encompassing the civilian war agencies. Most serious duplications, wasteful methods, and complex procedures existed during World War II, when the organization of these agencies was largely improvised. Their very multiplicity impeded the accomplishment of essential activities. Many of their charters were drawn in such general terms that it was difficult for the Army and Navy, and even for the agencies themselves, to determine exactly what their responsibilities were. The War and Navy Departments found it necessary to maintain large staffs merely for conducting business with the maze of Washington agencies, and too much time and energy was uselessly expended. Although it is not the business of the military establishment to control or interfere with the civilian agencies necessary for the conduct of war, the Armed Forces have a most vital interest in their efficiency. The organization of the Executive Branch of the Government for war must be examined, and careful plans developed, in order that the benefits of all possible improvements, simplifications, and economies in directing and controlling the Nation's effort in the event of another emergency may be derived.

World War II disclosed other important lessons. Earlier wars were confined to a few well-defined combat areas. The divisions of responsibility and spheres of action between our land and sea forces were clear-cut. World War II marked a radical change in the manner of waging war. World War II covered the globe; weapons became more numerous, interchangeable, and varied; airpower developed into a major offensive force; armed forces grew larger and infinitely more complex; joint operations were the rule. Future security demands that we anticipate a global war, in which all combat elements engage, in every Theater, under a single command controlling all forces—land, sea, and air. We must be able to employ all three major arms in appropriate balance and force the instant war strikes. Only the most complete of the entire logistic mechanism will assure our ability to concentrate the full logistic strength of the Nation where it is needed, regardless of the fighting force served. Such integration must be accomplished in peace—it is too late to attempt it in war.

Logistic organization and procedures within and between the military forces were far from perfect during the recent war. Too much of our success was accompanied by inefficient practices. Too much was accomplished only by placing ter-

rific strain upon the energies of our logistic leadership. Not enough can be attributed to sound organization and efficient procedures. The many self-contained procurement and supply agencies, eight in the War Department and eight in the Navy Department, had an adverse effect upon both industrial mobilization and the supply of combat forces. Duplicating supply lines and different standards of service among the Army, the Navy, and the Air Forces complicated and slowed logistic operations. Within the War Department itself two logistic organizations developed, one for supporting the Army Ground Forces and another for the Army Air Forces.

Complex organizational structures for Army administration, services, and supply existed in each oversea Theater. No two were alike, and no entirely satisfactory organization was developed during the war. Large headquarters with ill-defined and duplicating functions were the rule and achieved only partial success in coordinating supply. It was War Department policy to give complete autonomy to Theater Commanders in organizational matters. Recommendations made by the Commanding General, ASF, for standardizing oversea logistic organizations throughout the world in the interest of facilitating supply and improving administration and services were rejected. The importance of proper logistic organization in Theaters of Operations was not understood. It had received too little attention in peacetime.

The importance of logistic organization and functions in Theaters of Operation was not understood within the Army. The subject had received little attention in peacetime. Lack of doctrine governing logistic activities complicated relationships between Theaters and supporting supply agencies. Each Theater Commander was free to set up whatever type of logistic organization he desired, with the result that no two were alike. Differing systems, procedures, forms, and nomenclature constituted barriers that made coordination difficult.

Efforts of Theater Commanders to coordinate Army, Navy, Marine, and Air logistics were difficult and left much to be desired, because of inherent differences in the basic organization and systems employed by the three Services. Single operational command over land, sea, and air forces could not fully coordinate and unify logistic operations because logistic support was drawn from separate and independent organizations.

A fully satisfactory organization within tactical units of the Army for performing logistic functions in the field not developed during the war. The number of types of service units, over 150 at the end of the war, is one indication of the confusion in this field. In addition, special units or units with special equipment were continuously created. There was an unnecessary overspecialization in types of service troops, thereby making it difficult to secure maximum flexibility in the utilization of service personnel. There was some experimentation with combined service units, but this type of organization, which had much to recommend it, was not pushed vigorously nor fully exploited.

At the beginning of the war, the War Department had been ill-prepared for handling large-scale logistic activities. No adequate methods existed for calculating supply requirements, balancing them against resources, or for controlling procurement. Peacetime stock accounting procedures, primarily designed to deter-

mine and charge losses, impeded rather than facilitated supply operations. The establishment of the Army Service Forces early in the war placed a great many of the logistic functions performed in the Zone of the Interior under a single Command that devoted much of its energy to the improvement and simplification of supply, administrative, service, and procurement systems and procedures. The new Command brought to bear the most advanced managerial experience in industry and Government, and made tremendous progress in developing uniform, efficient procedures. The Army Supply Program, the Supply Control System, the War Department Shipping Document, the Army Service Forces Personnel Control System, and the systems for domestic and overseas requisitions are examples of the logistic techniques developed. Standard, simple techniques for systematizing all recurring operations were also created. During the war the Army Service Forces sought the best key personnel, proper organization, and a framework of practical, well-understood procedures. These are practices that have been neglected by the Armed Forces as a whole. When compared with private enterprise, our Armed Forces have been backward, except under the impulsion of war, in utilizing modern managerial methods. The gains of the war must not be lost. Managerial improvements must be continuously and vigorously sought and applied.

Throughout the war, troop bases authorizing the numbers and types of troops to be activated, trained, and deployed were unsatisfactory for logistic purposes. In 1943 at least 9 different War Department Troop Bases governed logistic planning and action at any given time. The Army Service Forces was compelled to anticipate the plans and decisions of the Combined Chiefs of Staff, the Joint Chiefs of Staff, and the War Department General Staff in order to have sufficient lead time to implement them. War is unpredictable and does not lend itself readily to precise long-range planning; however, a better system must be developed for estimating troop requirements and anticipating the deployment of units—one that will provide the logistician time and a firm basis for producing munitions and equipping the forces needed to implement strategic and operational plans.

Throughout the war insufficient numbers of service troops were provided in the War Department Troop Bases, which governed the number of service personnel trained and units activated. The needs of Theater Commanders were never completely filled; nor was the quality of service units as high as desired, because sufficient time was seldom provided for their training, and the need for the assignment of able individuals to service activities was not fully recognized. It is clear that in the future service troops will be increasingly vital to operations, that they must be carefully trained, and that they must be provided in adequate members both in the Zone of the Interior and in the Theaters of Operations.

Faulty military personnel administration was the source of a great many problems encountered in logistic operations, and the handling of military personnel was less efficient, in general, than other activities. Personnel policies and procedures governing the flow of individuals through induction, processing, training, assignment, and shipment overseas were complex and wasteful. Although the Army Service Forces made substantial progress in controlling and utilizing its own personnel, progress was not satisfactory throughout the War Department or in the

oversea commands. No accurate statistics exist, but it is safe to say that the time lost because of unnecessary processing and delays in assignment was enormous. Methods of estimating personnel requirements in specific categories and of controlling assignments to such categories were inefficient. Personnel is the heart of any enterprise. Certainly it is basic to warfare. We were scraping the bottom of the barrel before World War II ended. Inefficiency in the utilization of the Nation's manpower will be unsafe in a future war.

Training in logistic planning and operations had been seriously neglected by the educational system of the Armed Forces. The Army War College and the Army Industrial College before the war gave attention to certain phases of these subjects, but the overwhelming emphasis in officer training was upon tactics. The curricula of the Service Schools and the Command and General Staff School seldom included the handling of units larger than division or corps. Nowhere in an officer's training was there a comprehensive treatment of the logistic problems of the War Department or Theaters of Operations. Extensive knowledge of purchasing, production, distribution, storage, transportation, construction, communications, hospitalization, and finance was possessed by too few persons within the Armed Services. No captain of industry or commerce, regardless of his ability, was qualified to deal with the large and complex problems of Theaters of Operations, of the Technical Services, or of the War Department. This was also true of some of the officers who were made responsible for large and important commands. Few had training or experience in the management of large enterprises or the broader aspects of logistics. Granting the fundamental importance of logistics in modern war, it follows that military leaders must have a thorough appreciation and knowledge of the subject as a prerequisite to top command.

World War II demonstrated the importance of scientific research in the most spectacular manner. Never in the history of warfare were there more rapid and far-reaching scientific and technological developments in weapons. This was achieved through the unprecedented teamwork of science, industry, and the military. A most important logistic lesson is that our safety depends upon the continuation of this close collaboration in the development of new instruments of war. Scientific research is never static, nor is the secrecy surrounding weapons and production processes ever permanent. Our present superiority cannot be retained without a comprehensive, long-range research and development program designed to assure full scientific, industrial, and military participation. Such a program will be costly, but we dare not let penny-pinching or neglect endanger our security.

Victory in World War II was fashioned of superior munitions, of mobility, and of the skill, cooperation, and courage of our fighting forces. The exact nature of any future war cannot be foreseen. That it will be different from World War II is a certainty. Technological advances already have made obsolete many of the weapons and tactics of the last war. Self-propelled and guided missiles may eventually replace artillery and aircraft as major weapons. It is uncertain whether or not new applications of atomic energy will render battleships and carriers ineffectual and reduce the role of infantry and armored divisions to that of security and occupational duty. No one knows what offensive or defensive weapons electronics may

provide. If new developments prove to be as revolutionary as it appears they may, it is entirely possible that contemporary concepts of naval, air, and ground warfare will be outmoded. It is already clear that different strategy, different tactics, and different methods of organizing the combat elements will be employed in a future war. Warfare will become more mobile, more mechanical, more destructive, more dependent upon science and technology. War will tend to involve more and more of the world's population and to spread to every corner of the globe.

It is inescapable that logistics will play a predominant role in any future conflict. Provision still must be made for the maintenance and comfort of the combat forces, regardless of their mission, and regardless of how they are organized and deployed. The rapid movement of troops and equipment to threatened points throughout the world will be of the utmost importance. Rapid mass production of new and improved weapons and all types of military equipment will be imperative. The destruction of logistic potentials will be the primary objective of warfare, the defeat of combat forces in the field becoming a secondary consideration.

The security of the United States presents a complex problem in logistic preparedness. How should we plan, and how can we organize for national security? What should be the place of logistics in the organization? What should be the relationship of logistic agencies to the combat arms and to other Government agencies? What is the best internal organization for accomplishing logistic functions? How shall we provide for the continuous research and development of new weapons; for adequate quantities of equipment and sufficient numbers of trained forces to meet sudden attack; for rapid manpower, industrial, and Governmental mobilization?

These are questions for which we must find satisfactory answers. They must be approached objectively, intelligently, and with courage. It is inevitable that the human tendencies to revert to old habits of thought and action, to promote segmentary interest, to protect the established order, to resist change, to be swayed by sentiment, will exert powerful influences. These tendencies have no place in our efforts to insure our Nation's security. Realism demands that we rise above lesser motivations and loyalties and work always for the highest good of the Nation.

Our future security depends upon the application of the logistic lessons of World War II. If the United States should again be attacked at a time when we are logistically unprepared, the result will be disaster.

Summary

Wars cannot be won without logistic superiority. The major logistic axiom of any war is: "*Get there first with the most.*" Our inability to support the Philippines lost them. Skill, courage, and guts are not enough.

The outcome of the next war may very well be decided by what we have at the moment war strikes. The United States will be the first target next time, and we cannot count on Allies powerful enough to rescue us, once overcome.

The logistic organization with which we will fight must be in being and capable of immediate expansion. Our 1941–42 logistic organization had to be radical-

ly changed and a logistic command created. There will be no time for reorganization if war strikes again.

Military effectiveness must govern, but *logistic supportability is the first prerequisite.* Our resources are limited. The utmost economy within the framework of military effectiveness is imperative. Whether or not we use our resources efficiently is apt to mean the difference between victory and defeat.

We must be able to strike with full force and to *maintain that force until victory is won.* The Germans unquestionably had logistic superiority at the start of the war. They lost the war because they were unable to maintain that superiority.

Industrial and Governmental mobilization planning must be complete, precise and capable of instant execution. We shall not have time, by trial and error, to improvise war agencies in the future. Nor can we expect to survive duplication or inefficiency.

Our research and development must secure and maintain, and our intelligence must confirm, *unquestionable superiority in weapons and military equipment.* The best possible balance between superiority in quality and superiority in quantity is imperative, and must be in being at all times.