THE GENERAL BOARD

United States Forces, European Theater

SUPPLY AND MAINTENANCE ON THE EUROPEAN CONTINENT

MISSION: To prepare a Factual Report of the Supply and Maintenance on the European Continent as conducted by the Communications Zone, European Theater of Operations, D-Day to V-E Day.

Ref: "The General Board was established by General Orders 123, Headquarters European Theater of Operations US Army, dated 17 June 1945, as amended by General Orders 182, dated 7 August 1945 and General Orders 312 dated 20 November 1945, Headquarters United States Forces, European Theater, to prepare a factual analysis of the strategy, tactics, and administration employed by the United States forces in the European Theater."

File: 401/14

Study No. 130

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UNITED STATES FORCES, EUROPEAN THEATER
APO 408

LOGISTICAL SUPPLY AND MAINTENANCE OF UNITED STATES FORCES ON THE EUROPEAN CONTINENT

D-DAY TO VE-DAY, 1944-45

CHAPTER 1

PREFACE

1. In the early stages of American participation in the World-wide war which came to a victorious close during the spring and summer of 1945, President Roosevelt made the far reaching statement, during one of his famous "fire-side chats", that total defeat of the Axis Powers could and must be accomplished by the defeat of Germany initially, and that victory over the other two arch-partners, Italy and Japan, must await that event. He further stated that Germany could be defeated only by a large-scale invasion by the Allies of the land mass which had come to be known since, 1940, as Fortress Europe. Here then, in those few words was contained the germ of the plan by which the destruction and surrender of the German military machine was so thoroughly accomplished in 1945. No need to elucidate the early defection of Italy from the scene in 1943, which provided a potent stepping stone for the invasion of "Fortress Europe", from the South. The complete defeat of the Axis forces in North Africa had contributed to the process, by removing many thousands of potential enemies from the Mediterranean field of action. The successful invasions of Sicily and Italy in the summer and autumn followed soon thereafter. The magnificent defense by the Russian Armies, after Hitler's invasion of Russia on 22 June 1941, monopolized the attention of a huge portion of Germany's forces, while the other Allies were preparing the final knock-out punch which was initiated in the summer of 1944. FDR's historic prediction provided the inspiration which finally bore fruit for all the civilized world, leaving only the uncivilized Japanese to be dealt with as the crowning blow.

2. This report is the story of the machine which furnished the logistical support of the final blow against the West Wall of "Fortress Europe". It relates the magnitude of the problem of supply behind a huge combat force invading a friendly but enemy-occupied country; how the planners devised the details; how the people back home provided the material and equipment essential to a modern day invasion force; how the railroad and ship's crews brought that material to Europe for the jump-off and kept it coming until success of the Allied Military force crowned their effort with the accompanying glory of achievement; how the soldiers in the Service units alongside and behind their fighting comrades contributed to their welfare and bolstered their spirit with the assurance of supplies following close up behind their lightning advances and their several enforced stale-mates; it tells the story of the Communications Zone of the European Theater of Operations; the trained men and women who made up the organization and did the work of supplying and maintaining their brave comrades in arms who sometimes dashed and at other times staggered, but always onward with eyes to the enemy front.

3. The Communications Zone moved onto the playing field of France as part of the first team which won the game; not as the second team or

the scrub squad who filled in the gaps made by the opposition; they assisted the man who was throwing the forward pass, making the off tackle play or end run, or crashing through the center of the line. And finally they joined the swarm who drove over the goal line, -- they helped to made the touchdown and kick the placement goal for a full and perfect score.

4. Men in the Service of their fighting comrades were what they were called -- Men of Service — and they shared the satisfaction of playing their own position to the last ounce of their strength, and helping to win the game.

CHAPTER 2

INTRODUCTION

5. a. General. This report covers the logistical supply and maintenance, by the Communications Zone, ETOUSA, and its several component parts, of the Campaigns conducted by the 12 Army Group in Northern France and the 6 Army Group in Southern France. While the headquarters of these two Army Group did not become operational until after D-Day in each Zone, they controlled the major tactical part of each operation to the conclusion of the campaign, and each Group contained as integral parts, the subordinate units which had initiated each separate operation.

b. The 12 Army Group consisted of the First and Third United States Armies, initially, later augmented by the Ninth and Fifteenth Armies. At its greatest strength, on 24 April 45, it contained 48 US combat divisions.

c. The 6 Army Group consisted of the Seventh United States Army and the French First Army, and on 24 April 1945, it contained 16 US combat divisions, and 8 French combat divisions.

d. Total personnel US.

(1) On 30 April 1945, the European Theater contained approximately the following United States Army personnel:

Field Forces (12 and 6 Army Groups)	1,613,000
USSTAF (Air Force)	260,000
CFRC (Reinforcements)	142,000
Com Zone	544,000
Non-operating (CA, CID, etc)	70,000
	2,629,000

(2) The French First Army was composed of approximately 240,000 officers and men and under the terms of the French Rearmament Program the supply and maintenance of this force was principally from United States sources

(3) Other Miscellaneous Personnel. On 30 April 1945, the following personnel were also supplied and maintained principally from United States sources:

Italian Service Units	38,000
Mobile Service Units	31,000
Displaced Persons	32,000
Prisoners of War	288,000
	389,000

e. Grand total, personnel. From the above, then, it will be seen that there were approximately 3,258,000 persons, on 30 April 1945, who were almost wholly dependent on United States' supply and maintenance stocks and facilities. The prisoners of war referred to above were principally those who had been in Allied custody for some time and were located in the rearward areas of the Theater. There were, also, on 30 April 1945, approximately 1,800,000 prisoners of war in the forward areas, in custody of the Armies and the Advance Sections, but who were supplied and maintained to a large extent from captured German stocks.

f. Motorized Support. The European Operation was conducted principally in or with motorized and mechanized vehicles in the over-all

numbers of approximately 65,000 combat vehicles and 400,000 General and Special Purpose motor vehicles, not including about 170,000 motor vehicle trailers of various types, on 20 April 1945.

g. Weapons Support. On 30 April 1945, the following weapons were in the hands of the US and French forces of the Theater, requiring supply of ammunition and maintenance:

Automatic weapons, including 37 mm and 40 mm Howitzers	342,000
Mortars, 60 mm and 81 mm	19,000
Small Arms	3,085,000
Field Artillery, light and medium guns and Howitzers	13,000
Heavy Field Artillery and Anti-aircraft guns	2,275
	3,461,275

h. Aircraft Support. At the peak of the operation there were approximately 11,000 aircraft of all types in the Theater.

i. Support of Liberated Peoples. In the occupied countries of France, Belgium and Holland, there was an ever increasing need for material assistance to the liberated peoples, particularly in the form of food, fuel, medical aid and transportation, as well as the spiritual aid toward their welfare and morale. The Civil Affairs Sections of all combat units down to include Division, and all Communications Zone echelons distributed this aid to every occupied community, assisted by co-operative nativecivilians and military agencies. How many people were dependent, to a great degree, upon this most humanitarian form of succor, for their ultimate recovery and return to normal conditions, will probably never be known.

j. Com Z Responsibilities. The supply and maintenance of this huge population of human beings, motor equipment, weapons and aircraft, was principally the responsibility of the Communications Zone, European Theater.

6. Classes of Supply.

a. In general the items required for supply and maintenance of military force are sub-divided into the following classes:

Class I	Rations and Forage.
Class II	Clothing and equipment.
Class III	Petroleum Products.
Class IV	Special items of equipment, light, medium and heavy, including motor vehicles.
Class V	Ammunition.

b. The maximum number of men, vehicles, guns, and air craft is mentioned in the foregoing because they composed the more predominently vital essentials of this military operation. For their operation was required the huge tonnages of Class I food for the men, Class III gasoline and lubricants for the vehicles and aircraft, and Class V ammunition for the guns. However, these classes of supply and maintenance items did not in any sense, over dominate Classes II and IV, While Class II and IV, due to their nature may be considered incidental to the other three for day to day operation they are equally critical in the long run and of stupendous volume. Human beings, no matter how well fed, cannot fight in sustained combat unless they are properly clothed, shod and equipped. Motorized units cannot advance rapidly against the hostile force unless bridging material is at hand to span otherwise impassable water barriers. Efficient control of complicated wide scale military operations cannot be exercised unless communication facilities

are operative. Combat air craft can operate much more effectively from prepared air strips close behind the advancing forces than from bases far to the rear. The rehabilitation of railroads and highways requires many items of Special Equipment. Construction of fortifications and other defensive installations requires specific types of material.

c. Many items in Classes II and IV. are of special design and manufacture and are supplied in a foreign theater under pre-arranged estimates for distinctive planned phases of the operation. While overall volume of some items may not necessarily be large, their immediate availability is a paramount factor in the success or failure of that particular phase for which they are intended. Class I rations and Class III POL are limited as to particular items and, except for their volume, are comparatively simple to manufacture, transport and issue. Class V ammunition is composed of a large number of types and handling is complicated, and tonnage is tremendous.

7. Two World Wars.

a. (1) There have been instances in historic military operations where the invasion force either planned to or was forced to, and did effectually, live off the invaded country. In this campaign a huge force was invading, France, a friendly country which, together with Belgium and Holland, had been defeated and occupied for four years by German Military forces, during which period the enemy's highly developed industrial machine absorbed much of the existing industry and local stocks of material which were essential to augment Germany's own national production. Thus were these three countries assumed to have been denuded of nearly all material products and machinery of the sort which the Allied armies would otherwise have been able to use.

(2) In the World War of 1914-18 the Allies had occupied France under diametrically opposed national conditions, in that the major part of the country had not been occupied by the enemy forces and much of the material and industrial facilities in France were available to the Allies from Great Britain and the United States. Seaports, railroads and highways were in their normal condition and their use could be definitely incorporated in the Allied planning for the immediate employment of France as a huge base of operations, followed later by Belgium. French and Belgian military organization also was at a peak, except for the normal losses of a relatively small part of enemy-occupied territory in France and Belgium adjacent to the German frontier, and the abnormal loss of manpower.

(3) In the operations of 1944 in which the Allied forces made their initial landings against hostile opposition in areas already occupied by the enemy, their plans included the shipment of the greater part of their supplies and equipment from depots across the water and for delivery behind and along side the combat forces as the operations were initiated and continued. The logistical planning for such a stupendous and complicated effort by the United States forces and its accomplishment to a high degree of perfection under most inauspicious conditions is one of the outstanding feats in the history of warfare, and forms the principal part of this report.

(4) The majority of the bulk of supplies and equipment used by the American forces in Europe was produced in the United States. Much of it had been gradually building up in the British Isles and in the Mediterranean bases, thus requiring trans-shipment to the continent, but a great deal also, after sufficient French territory became available for storage, came directly from the U.S. to the French ports and beaches, and later to the Belgian ports.

b. (1) In any military operation, no matter how great or insignificant, the world at large follows closely the tactical operation, both successes and reverses, with avid interest, because the combat area is where the danger lies and where acts of heroism place the lives limbs of beloved participants in crucial jeopardy. The effort of an entire nation in producing the materials and equipment with which the front line combat fighters accomplish their adventurous and heroic successes, is all too frequently forgotten or unconsciously ignored by reason of the prosaic nature of such effort. Due credit should and must be given to the millions of people back home who planned for, organized and converted their normal activities to fit the needs of the military soldiers at the front. Untold sacrifice, hardship and disturbance of even their barest normal functions, is the lot of millions of people in the homeland, and this without the glory and glamour which inspires the participants in the theater of operations to go forward, ever forward, toward the hostile lair, to successive victories, the destruction of the enemy, and final surrender. It is the happy lot of relatively few only to be close to the scene of that surrender; and even among the ruins, the bloodshed and the misery of the fighting front, the thrill of victory is for a time due compensation for the fatigue and hardships endured by all combat soldiers in such a war as this one. But to the many millions back home there is no such glamorous proximity--only the everlasting grind at some comparitively minor task which turns out to be only a small cog in the great over-all machine; but all too often the vital importanct of that cog is forgotten.

(2) Thousands of Allied men and women risked their lives in the sea and air borne transport of millions of tons of essential supplies and equipment; the seamen who manned the ships, and the crews of air planes droning high above the limitless oceans. Civilians operating the railroads and ports of embarkation in the United States strained their staying powers to the limit in order that material, supplies and equipment might be sent across the Atlantic Ocean to the waiting millions of American soldiers who need it in their supreme effort to put down forever the Nazi legions who had dominated their thoughts and actions for nearly five years.

(3) So, again much credit and gratitude must be given to the millions of non-military men and women who backed up, with all the strength and power of a thoroughly coordinated democracy, the military operation of the combat force which they had organized and sent overseas.

CHAPTER 3

MISSION OF COMMUNICATIONS ZONE, ETOUSA

8. In planning a tactical operation in any theater in present day modern warfare, the capabilities of the logistical program for support of that operation have a vital influence toward the successful accomplishment of the mission of the combat force. The general mission of the combat force may be expressed very briefly and with concise precision, likewise the mission of the logistical unit which is to perform the myriad details of supply and maintenance in rear of that combat field force. The field force commander must be relieved of all long range problems of logistical support except those directly involved in the sustenance and transport of his own organic manpower, the maintenance of his mechanical elements and the provision of adequate ammunition with which he can accomplish his mission. That mission is generally and primarily the destruction of the hostile force and secondarily the progressive seizure of territory from which the primary mission may be continued. The combat force must not be hampered in any way by the necessity of holding a large expanse of territory over which it has successfully passed by force of arms, nor in having to organize and operate large scale logistical processes for his maintenance in the pursuit of his objective.

9. The Theater Service Force is the organization to which is delegated the mission of that supply and maintenance which permits the field force commander to proceed unhampered, except by enemy action, toward his ultimate goal of the destruction and enforced surrender of the opposing military force.

10. In the European Theater of Operations that Service Force was the Communications Zone of ETOUSA and its several component parts in operation "OVERLORD". In the Mediterranean Theater that Service force was known as the Service of Supply until it eventually merged with and became subordinate to the Communications Zone of ETOUSA.

11. Communications Zone, of ETOUSA was organized and initially operated in the United Kingdom within a relatively small and condensed geographical area, and initially served the Northern Operation from that restricted island base. The Southern Operation was served by the Mediterranean Service of Supply from many widely separated bases in North Africa, Italy and the Island of Corsica. Both eventually received supplies from the United States. Divergent processes of logistical support between the two service systems were eventually reconciled into a high degree of uniform procedure which was developed from the best features of both systems. The experience of logistical support afforded by Com Z had largely been gained in the supply and maintenance of large forces concentrated in the United Kingdom under non-combat conditions, while that of the Mediterranean SOS was, to a considerable degree, the product of actual experience in combat operations. The lessons acquired were early transmitted by each to the other in the ultimate consolidation of ideal planning procedures which contributed toward making final victory possible. The manner in which these procedures were applied to the successful conclusion of the combined operations in the European Theater is the subject of this report.

CHAPTER 4

SCOPE OF THIS REPORT

12. This report encompasses the major details of the several components of the two service forces with brief outlines of their specific character, missions and processes, accompanied by a listing of the prearranged plans and estimates; factual data concerning the features and circumstances of both favorable and unfavorable aspect which ultimately dictated minor modifications of those plans and operational processes; unforeseen events which occurred to disturb the orderly and methodical systems provided in the original conception of both operations; the the advantages and disadvantages of the major features of a logistical nature whereby ultimate success was attained; and conclusions based thereon.

13. This discussion is limited to the operation of only United States forces in the Northern Operation and to the operation of United States and French Forces in the Southern Operation.

14. Comments on the organization and function of Com Z and SOS prior to their respective D-Days are restricted to sufficient detail only to provide a requisite background for a full and complete appreciation of the text of this report.

15. All of the factual data contained in this report is based upon authentic documents listed in the bibliography.

16. Throughout this report the "ton"referred to is the LONG TON of 2240 pounds, unless otherwise specifically mentioned as a "ship ton", "air ton", or their respective equivalents.

17. This report does not to any great degree discuss the details of the individual services involved in Supply and Maintenance, as they are all covered elsewhere.

CHAPTER 5

OPERATIONS "OVERLORD" AND "NEPTUNE"

18. a. The Normandy Operation was initiated on 6 June 1944 by combat and service elements of the First United States Army. On D plus 49, 24 July 1944 this force became a component part of the Twelfth Army Group which continued the operation through out the campaign in Northern France, Belgium, Holland and Germany.

b. "OVERLORD" was the code name of the over-all plan of operation to follow an assault on the Coast of Northern France, while Operation "NEPTUNE" was the plan for "assuring a logement area on the continent from which further offensive operations can be continued."

c. The system of logistical supply and maintenance of Operation "OVERLORD" was based upon comprehensive plans devised by the Communications Zone of ETOUSA in the United Kingdom.

d. Communications Zone Organization in the United Kingdom was composed of a headquarters and several base sections located in England and Northern Ireland. Several of these base section ultimately moved to the Continent, more or less intact, and assumed specific area base functions. The first base section to arrive in Normandy was known as the Advance Section (ADSEC), its units landing between D plus 3 and D plus 41, with the mission of operating immediately behind the combat force and furnishing direct logistical support of that force. On 10 July 1944, the First US Army established a forward boundary for ADSEC and this logistical unit became the initial element of Communications Zone on the Continent. On 14 July 1944, the Forward Echelon, Communications Zone (FECZ), established itself on the Continent as a control component representing Communications Zone. Headquarters of Communications Zone, ETOUSA, was established in Paris early in September 1944.

19. BUCO. An organization of the European Theater in Great Britain, known as the "Build-Up Control Office", (BUCO), had been established on the Southern coast of England for the purpose of controlling and phasing units to the Continent. An advance sub-division of this office was established on the Normandy Coast of France shortly after D Day, by the First US Army, which was known as LITTLE BUCO, the function of which was to receive the forecasts of BUCO and transmit them to the proper agencies ashore.

20. ADSEC's mission provided that ADSEC Service Units would be attached to the First US Army and they functioned directly under that combat unit until 10 July, 1944. ADSEC's mission under Plan "NEPTUNE" was "to provide a basis for further detailed planning and operation during the period D Day to the date on which the Army's rear boundary is established". A further mission was "responsibility for the development and operation of the Communications Zone in direct support of the advance to the Loire and the capture of Brest. Later, after reorganization of the Communications Zone it will develop and operate the easternmost portion of the Communications Zone in direct support of the combat elements within the limitations imposed by Forward Echelon, Com Z. Specifically, the mission of ADSEC includes the following:

a. Rehabilitation, construction and operation of:

(1) Ports, both major and minor, except that the minor ports of Grandcamp, Isigny and St Vaast would be operated initially by the Engineer Special Brigade.

(2) Roads

(3) Railroads

(4) Fixed Signal Communications

(5) Bulk POL installations

b. Preparation to execute Communications Zone Functions within the area of Communications Zone when established.

c. Perform Communications Zone missions in support of the Field Forces (FF) and the Air Force (AF) and in coordination with Anti-Aircraft Defense Command, US NAVY and British Army.

21. ADSEC functions D-Day to D plus 34. Until 10 July, when First US Army announced ADSEC's forward Boundary, ADSEC troops operated as Army Service Troops under Army Command. This relation continued until piecemeal delegation of functions were given to ADSEC, the troops involved then reverting to ADSEC Command. As further increments of ADSEC Headquarters personnel arrived following D plus 3, close liaison was established and maintained with their opposite members in the First Army Headquarters to prepare for the assumption by ADSEC of the responsibilities for supply and service functions. This transition occurred gradually, function by function, as agreed between the Army and ADSEC, until it was possible for Army to establish a forward boundary for ADSEC with the assurance that supplies would continue to flow as required and without interruption. The establishment of an ADSEC "ForwardBoundary" rather than an Army "Rear Boundary" permitted the CG of US Forces in France to retain direct command of all US Forces on the Continent. Thus, in effect, ADSEC functioned as a logistical major sub-division of the Field Army.

22. Logistical Build Up Planning, ADSEC.

a. The troop, vehicles and tonnage build-up from D-Day to D plus 90 as estimated in Plan "OVERLORD" was as follows:

Day	Total Troops Ashore	Total Vehicles Ashore	Average Tons Per Day Required
D	70,000	11,500	4,600
D plus 5	271,000	46,500	11,500
D plus 10	395,000	70,500	13,400
D plus 15	513,000	94,500	15,800
D plus 20	633,000	132,500	19,400
D plus 30	808,000	-	21,700
D plus 40	934,000	-	23,700
D plus 70	1,104,000	-	24,400
D plus 90	1,264,000	-	28,600

b. Reconstruction and Rehabilitation. The estimate of the degree of reconstruction and rehabilitation necessary for continental facilities up to D plus 41 was as follows:

Installations Of Facility	Extent of Construction
Ports	90% for quayage, buildings, etc, Road and rail access and locks blocked 100%, handling equipment, water, and electrical services.
Railroads	55% rail entirely gone; 30% salvageable for relaying.

	100% bridging; some damage to roadbeds, especially in culverts, and to watering and coaling facilities.
Highways	10% requiring reconstruction (First Army to reconstruct bridges.)
Hospitals	100% required
Personnel Accomodation	33% required
Hospital accommodations	33% required
Hospital staff	67% required
Depots (open and Covered)	67% required
PCW enclosures	33% required
Shops	67% required
Special plants	67% required
Headquarters	0% required
Signal Communications	Not entirely destroyed, but requiring repairs before use.

Such was the basis upon which ADSEC plans were formulated. The task was impressive in scope and exacting in detailed requirements; thus very early in the preliminary period methods and procedures for the planning itself had to be determined and standardized as much as possible so that procedure would be orderly and coordination within ADSEC would be facile.

23. Phase Back of ADSEC Units.

a. ADSEC troop units had been phase scheduled in plan "NEPTUNE", but the late discovery of an additional German Infantry Division in the invasion area required that additional US combat personnel be landed at an earlier date than originally planned. Accordingly these units changed places with certain ADSEC troops on the shipping schedules; likewise certain supply tonnages were phased back, particularly construction material destined for the rehabilitation of Cherbourg. The overall net effect of this phasing back was not too serious from an ADSEC viewpoint. However, it did delay the operational activation date of ADSEC as a unit independent of the Army, but such delay was meaningless since ADSEC already was relieving the Army of supply and service functions at an increasing, although piecemeal rate.

b. One detrimental result was either the loss of a unit until that unit completed its job or the replacement of thatunit by a new arrival, with the consequent loss of time required for familiarization of the new unit with its new job. Depending on the point of view either condition was serious, but ADSEC was particularly concerned since certain units had been earmarked for specific important roles, and consequently their loss, even temporarily forced to some degree of improvisation.

24. a. Sites. In conjunction with the ADSEC "NEPTUNE" Plan ten-

tative sites were selected on the continent for every installation and unit, by map reconnaissance and aerial photographs. The great majority of the installations and troops were located in three maintenance areas in the rear of Cherbourg, Utah Beach and Omaha Beach. With suprisingly few exceptions these selections proved to be quite satisfactory in the Cherbourg Area because the tactical units, soon after the capture of Cherbourg moved South and thereby released this entire section for ADSEC installations and troops.

b. The sites and installations in the Cherbourg area were originally planned for a maximum port tonnage of 7,800 tons per day. Before these initial sites were fully occupied, the target tonnage for the port of Cherbourg was raised to 16,000 tons per day and eventually to 22,000 tons. This abrupt change was due to a desire to insure adequate "Weather free" unloading facilities in case other ports would not become available and to avoid the hazard of dependence upon the beaches any longer than absolutely necessary. At this time there was no positive assurance when the ports of Granville, St. Malo, Le Harre, and Brest would become available.

c. The plans made in England for the Utah and Cherbourg Maintenance Areas were not used because the advance of the armies was behind schedule and the combat and service units were superimposed upon each other in the very limited areas behind the beaches. This condition existed until the breakthrough at St Lo on 26 July and until that date the Army retained full control of the Utah and Cherbourg Maintenance areas. This conditions was further complicated by there being no control agency which had adequate records to show the location of all units and the sites which had already been allocated.

d. ADSEC G-4 Operation Branch was charged with the clearance and allocation of all sites for ADSEC use. The plan was unwieldy and complicated because initially it was necessary to deal with G-4 Operations Branch, First United States Army (FUSA) to obtain sites; later with G-3 Troops Branch and G-4 Operations Branch ADSEC, and finally with G-3 Troops Branch, FUSA, and then having this confirmed by G-4 FUSA.

25. a. Movement from UK to Normandy. Units arrived in the marshalling area in the UK were phased for overseas movement according to priorities established by FUSA. Build Up Control Office (BUCO) was to send a forecast to the Continent, giving information regarding the serial number of the shipment, number of the boat, and when the unit was due to arrive. This information was to arrive on the Continent several days ahead of theshipment. A report was then to follow stating when the ship actually sailed. The report was to go to the Hq Advance Section, to the Water Transport Control Office and the Beach Brigade. The Naval Office in Command (NOIC) was then to notify all concerned when the ship was off the beach, whereupon the ship would be called in and spotted for unloading. The unit was then to be unloaded and the Beach Brigades were to furnish guides to conduct the troops into the transit areas where an ADSEC Liaison Officer notified the Headquarters and the Chiefs of Services in order that they might move the units out of the beach transit area to their assigned bivouac. Vehicles entering the transit area without personnel were to be utilized to transport personnel from the transit area.

b. This system did not function any too well because of a heavy volume of message traffic, some communications failures and, primarily because the procedure was involved and clumsy. Accordingly, in order to improve the situation ADSEC teams consisting of officers and enlisted men, were stationed in all the transit areas to meet all incoming ADSEC units, who were then informed of all pertinent details concerning the situation and given directions and strip maps or guides

to escort them to their destinations. The twenty-four hour limit, established by the FUSA, for remaining in the transit area, in conjunction with the retarded tactical position, compelled several of the sections, notably the Medical, Ordnance and Quartermaster, to set up and maintain bivouac or staging area for their own troops. These troops remained there until it became possible for them to take possession of their assigned locations.

26. Logistical Supply Periods. The period from D Day to VE Day in the Northern Operation may well be divided into the following phases, each being dictated by major changes in the tactical situation at the time, and each possessed of specific characteristics such as; congestion at the beach area, including Cherbourg; available rail transport, necessity for motor transport ot supplant that of the railways; increased opposition; extended lines of communications; unfavorable weather; counteroffensive activity; collapse of the hostile force; crossing of physical barriers.

Phase I

From D Day thru "Breakthrough" 6 June to 31 July 1944 (D-D plus 54)

This phase covered the actual landing, beachhead operations, securing of logement positions, securing the Major Port of Cherbourg and acquisition of adequate maintenance areas for static supplies before launching an all-out offense against the enemy, which resulted in the breakthrough at St. Lo.

Phase II

Closing to the Seine River, 1 August to 27 August 1944.

Twelfth Army Group became operational and the plan of main attack was charged to the East toward Paris instead of to the Loire River and the Brittany area. Supply dumps could sustain advancing troops as far as the Seine and the moving forward of army dumps was started; rail development and deliveries were limited to short distances during this period. The main burden of overland movement was handled by motor transportation.

Phase III

Operations from the Seine to the German border in the North and the Moselle River in the South. 28 August to 7 November 1944.

Overtaxed supply facilities to meet the tactical situation caused the First US Army to halt on the Siegfried Line in the North and the Third US Army came to rest along the Moselle River in the South. This phase was spent in moving supplies and installations forward in an attempt to get logistical support into a reasonable position for further major operations. Sixth Army Group moved up the Rhone Valley and entered the Vosges Mountain area between the Moselle and the Rhine. Sixth Army Group closed off the "Escape" gap through Belfort, and on 14 September its left flank joined with the right flank of the Third US Army.

Phase IV

Resumption of Major Operations - 8 November to 15 December 1944.

Although the supply situation remained unfavorable in a number of items, it was assumed that the offensive could be resumed at the beginning of this period, due to marked continental improvement in the overall logistical position. The winter clothing shortage was largely cor-

rected and stocks of the Services were in better shape than ever before. Studies were made and conclusions reached that further operations for closing to the Rhine could be supported. The port of Antwerp was opened 28 November which, together with Le Havre, Ghent and other upper Channel ports produced a condition of supply from the Northern flank rather than entirely from the rear. (See Appendix 1).

Phase V

The enemy's counter-offensive; regaining the initiative - 16 December to 21 February 1945.

On 16 December a powerful and well coordinated offensive was launched by the enemy with the object of splitting the American forces. However, soon after the first of January 1945 the offensive was definitely contained in all directions and all lost territory was substantially regained by 5 February. All supply dumps in danger were evacuated and the only losses were T/E equipment in the hands of forward troops. Supply dumps now had to be moved forward again in preparation for the closing to the Rhine.

Phase VI

Closing to the Rhine north of the Moselle and seizure of the Remagen bridgehead. 22 February to 14 March 1945.

The overall supply position was good, armies were well prepared to undertake operations to close to the Rhine. Engineer supplies had been built up for the Rhine crossings. Large stocks of all supplies of all services had been built up during this period. The capture of the Remagen bridge was an unexpected asset to supply problems.

Phase VII

Crossing the Rhine in force and encirclement of the Ruhr industrial area. 15 March to 4 April 1945.

This short period was for final preparation for the drive across the Rhine and the coordinated offensive by all armies which resulted in complete encirclement of the Ruhr industrial area. Rail lines were not adequate as yet and reliance was placed on motor transport and emergency air lift to secure adequate stocks to logistically support this drive. At this time the release of great numbers of Allied prisoners seriously depleted army food stocks in spite of the use of captured rations.

Phase VIII

Advance to Elbe River and contact with Russian Forces 5 April to 8 May 1945.

This phase was marked by extremely rapid advances by the armies, the capture of large numbers of prisoners, the liberation of millions of displaced persons and by the cessation of hostilities. Due to the ever increasing number of displaced persons, prisoners of war and recovered Allied military personnel, food stocks were becoming critical and rigid control was continued, the supply was having to be maintained by truck transportation as rail lines had not as yet been rehabilitated this far forward, nor was it possible to use inland waterways forward. However, sufficinet supplies were provided to support all tactical operations. Air supply was put to tremendous use during this period. Cessation of hostilities was on 8 May 1945.

CHAPTER 6

THE NORTHERN OPERATIONS

27. a. General. Details of the combat tactical operations involved in the Normandy landings are not discussed in this report inasmuch as they have been covered elsewhere in a more comprehensive manner. However, certain features of the strategic and tactical planning and accomplishments had a direct bearing on the plans for and development of the logistical support and are herein mentioned briefly.

b. The principal assault of the American land forces was upon the 7,900 yards of beach between Point de la Percee and Colevaille in the Omaha Sector. The assault on Utah beach was along a 2,000 yard front near St. Mere-Eglise. The First US Army did not plan to set up any operational beach dumps. Initial dumps were to be set up as early as possible in D Day in fields back of the beaches but not over 200 yards distant. The plan to operate with the establishment of the Beach Maintenance Areas, located within five miles of the beaches, estimated to be in operation about D plus 3. The plans called for unloading 290,000 tons on Omaha and Utah beaches during the first twenty days; actually 204,500 tons were unloaded. On D plus 6 the Beach Maintenance Area began to receive supplies. While the quantity of supply stocks handled during the early stagesof the operation failed to measure up to expectations, only ammunition stocks actually became dangerously low. Following D plus 6 the situation improved somewhat, only to receive a serious set-back during the storm period 19-22 June when no cargo operations were possible. From that point, however, Class V stocks were built up rapidly.

28. Adverse Factors D - D plus 34.

a. The planned logistical support of the Normandy landing from D Day to the beginning of the breakthrough at St. Lo on 26 July was upset to a considerable degree by a succession of events of major importance which, for the most part, had not and probably could not have been foreseen. The first of these and the one which modified the original planning to the greatest extent was the delay in the capture and opening of the Port of Cherbourg. It was planned that the city would be in Allied hands by D plus 8 whereas it was not actually captured until D plus 20, and the port was not opened for unloading cargo until D plus 43 thus alone entailing a delay of 32 days. This factor alone dictated the use of the beach unloading facilities and the attendant congestion over an extended period.

b. The artificial harbor known as Mulberry "A" was wrecked by a four day storm beginning on 19 June. Also many cargo ships were sunk in the English Channel.

c. Due to other unforeseen factors it became necessary to phase back a number of units and their equipment and consequent period of confusion before these units were able to become operational. Units and their organizational equipment often arrived on different ships and at different times. This conditions forced even greater congestion in the maintenance area until personnel and equipment could be "married up".

d. Another contributing factor which could not have been foreseen by the planners of the combat phase in the establishment of the beachhead were the hedgerows of Normandy which as it transpired afforded excellent barriers for the German defenders. A shortage of ammunition for particular types of weapons and an absence of specific type weapons

themselves, most suitable for the overcoming of these obstacles, caused many unexpected delays in the expansion of the beachhead. This shortage was due to some extent to confusion in the control of cargo ships and faulty documentation of their cargo contents.

29. Unexpected favorable factors. There were, on the other hand, a number of conditions which reacted favorably to the early establishment of the beach head and Maintenance Area. Quantities of signal equipment and many signal installations were captured which were rapidly adapted to a condition of efficient operation. Large quantities of coal and other fuels were captured, thus allowing an early resumption of operations of local utilities. The control of the air was definitely in Allied hands and thus interference to operations by the German Luftwaffe was practically nil. The degree of destruction throughout the Normandy Area, except the Port of Cherbourg, was much less than anticipated. Storage capacities turned out to be even greater than anticipated.

30. Opening the Ports and Beaches.

a. The German strategy was aimed at insuring that our supply pipelines would never be permitted to flow freely. Examine, for example, the German strategy regarding ports. When Cherbourg was attacked the Germans held on as long as possible. Defenders of ports like Brest, St. Nazaire, Le Havre and Antwerp were under Hitler's orders to fight to the last man and last round of ammunition. "Deny the Allies the ports and they will be unable to support their armies ashore", was the German angle.

b. They did their best and, it must be admitted, were eminently successful. At the end of September, almost four months after the landing, we had only one major port, Cherbourg, through which to supply our troops, and Cherbourg had been, in peace time, principally a passenger port. Furthermore, it had been so thoroughly demolished that it took from 27 June, when it was captured, to 15 July to get it into condition whereby it could begin to receive cargo. (See Appendix 2).

c. Besides the Port of Cherbourg, plans called for the opening and development of six other minor ports, namely: Isigny, Grandcamp, St. Vaast, Barfleur, Granville, and St. Malo. All of these ports were opened ahead of schedule except Granville and St Malo, the latter being dropped because of the change in the tactical situation and replaced by Carentan. Opening of Granville was delayed due to excessive demolitions, but nevertheless was opened ahead of schedule.

d. And thus there were, by 31 August, 1,205,000 American soldiers and 231,325 vehicles ashore, using up supplies at an enormous rate. The beaches with minor aid from small ports such as St Vaast, Isigny, Barfleur, and Grandcamp were the answer to the problem. That is where the major portion of our forces' supplies came into the Continent in the early stages of the invasion.

e. Through Isigny and Grandcamp and over Omaha and Utah beaches rolled, in the first 25 days of the invasion (June), 289,200 tons of stores and 69,110 vehicles. The tide kept rising. In July with Cherbourg, St. Vaast and Barfleur also contributing, there flowed in 629,500 tons of stores and 108,450 vehicles. In August there arrived 930,280 tons of stores and 53,750 vehicles. Before Le Havre, the second major port, opened on 4 October there had arrived on the Continent 2,687,000 tons of stores and 265,200 vehicles. Le Havre was a minor factor at first, its first 12 days of operation netting only 6,680 tons of stores. Its first daily intake of over a thousand tons was on 16 October when it discharged 1, 760 tons. Therefore, up to D plus 120, entire dependence was on Cherbourg, the beaches and the small ports which, from 5 September, also included Morlaix.

f. These stores and vehicles were supporting a million and a quarter men, of whom 457,600 had arrived in June; 469,000 in July, and 297,500 in August.

31. Targets and Actual Landings, on the Continent, are shown below, cumulatively:

		Planned	Actual
D plus 30	Stores (tons)	613,150	411,130
	Vehicles	131,970	99,415
	Personnel	617,400	512,350
D plus 60	Stores (tons)	1,540,850	1,032,045
	Vehicles	213,260	188,845
	Personnel	926,500	949,995
D plus 90	Stores (tons)	3,070,160	1,944,025
	Vehicles	258,000	235,300
	Personnel	1,133,900	1,230,500

32. On the Omaha and Utah Beaches, the planned and actual unloadings in tons to D plus 20 were:

Day	OMAHA		UTAH		TOTAL	
D	2400	NIL	2250	NIL	4650	NIL
D+1	5100	NIL	4800	805	9900	850
D+2	7000	1430	5300	4380	12300	5805
D+3	5600	2540	4400	3165	11000	5705
D+4	7000	3940	4700	2400	11700	6340
D+5	7000	7185	5700	2265	12700	9450
D+6	7000	5750	5700	4145	12700	9895
D+7	8000	5460	5700	3840	13700	9300
D+8	8000	7375	5700	4960	13700	12335
D+9	8000	9005	5700	5735	13700	14745
D+10	9000	8535	5700	5930	14700	14465
D+11a	9100	8875	5700	4785	14800	13660
D+12b**	10200	8690	5700	5670	15900	14360
D+13	10200	5765*	5700	2575*	15900	8340*
D+14c	10300	675*	5700	325*	16000	1000*
D+15	10400	1075*	5700	480*	16100	1560*
D+16	10400	495*	5700	865*	16100	1360*
D+17	10600	9995	5700	6400	16300	16395
D+18	10600	11560	5700	5960	16300	17520
D+19	10700	12995	5700	7140	16400	20135
D+20d	11800	14450	5700	6900	17500	21345
Total	179400	125795	110650	78725	290050	204520

* The storm of 19-22 June 1944

** Special Engineer Brigades attached to ADSEC, Com Z.

a. Isigny Port opened

b. Mulberry artificial port opened

c. Grandcamp Port opened

d. Capture of Cherbourg

33. Port of Cherbourg. The most important single deficiency in the port project as a whole was in the planned capacity of Cherbourg. The capacity required rose from 7800 tons to 18000 tons and eventually to

22000 tons for reasons elicited elsewhere. While Cherbourg had the capacity to receive these tonnages there was not a corresponding capacity to clear the port area. The limiting factor of rail-out shipments remained constant throughout the operation and a considerable portion of the capacity of the port was, therefore, ineffective. Many supplies were off-loaded and placed in dumps in the Cherbourg area and never moved forward.

34. Planned Requirements by the Services from D to D plus 90 (in tons) were as follows:

Period		QM	MED	SIG	CWS	ORD	ENG	OTHER	TOTAL
D-D+14	A	88510	1325	10065	3385	72135	29070	6790	211330
	B	67940	1041	9470	2950	64650	28950	----	175000
D+15 to D+24	A	59995	755	19410	3600	51540	41725	24540	201565
	B	71790	530	15900	3965	52470	44515	16590	205760
D+25 to D+31	A	37900	670	17385	2650	33840	38290	25000	155935
	B	49065	530	13750	3505	43190	41560	15235	166835
D+32 to D+41	A	63345	980	15465	4505	43155	32850	37500	197800
	B	69070	875	16600	3380	59035	56520	27755	233235
D+42 to D+90	A	152105	11505	97740	18820	112240	162850	165135	720395
	B	374065	9985	104105	34505	373385	278635	233965	1408745
Total D-D+90	A	401855	15235	160265	32960	312960	304785	258965	1487025
	B	631930	12960	159825	48405	592730	450180	293545	2189575

A Planned

B Actual

35. Conclusions: Advance planning of port facilities to be available was seriously upset by delay in capture of Cherbourg, which in turn delayed progress of the tactical advance southward toward Brittany and the Loire Basin. The anticipated losses during the landing were not as great as expected, resulting in congestion of shipping in the roadsteads and further congestion on the beaches.

CHAPTER 7

DEVELOPMENT OF THE INITIAL BASE SECTION ORGANIZATION

36. a. Cotentin Peninsula. On 12 July 1944, the Cherbourg area was designated Area Number 1, which was placed under the Commanding Officer, 4th Major Port, who had been in charge of port operations since 27 June 1944. A representative from each of the special staff sections of Headquarters, ADSEC was designated to act as the Special Staff for the Area Commander.

b. The Area Commander was responsible to the Commanding General, ADSEC, for the rehabilitation of the port area, general security of the area, discipline of the personnel, and the general coordination and supervision of all Special Service, Army Exchange Service, religious and recreational activities pertaining to Area Number 1. The other command responsibilities were reserved for the Commanding General, ADSEC.

c. The primary mission during this period was the rehabilitation of the port of Cherbourg at which place the first ships actually discharged cargo into amphibious trucks on 16 July 1944.

d. The first tanker of bulk gasoline was berthed and unloaded to shore tanks on 25 July 1944 and operation of the Major Pipe Line system was inaugurated at once.

e. The magnitude of the increasing activities in the Port of Cherbourg and Area Number 1 quickly necessitated the discontinuance of the dual command. On 21 July 1944 Area Number 1 was deactivated and the Headquarters Cherbourg Command (Provisional) was established.

f. The nucleus of this Headquarters, which was later to be developed into Normandy Base Section, was initially provided by the Southern Base Section and other Base Sections formerly located in the UK. This nucleus was eventually augmented by personnel obtained from local units. The commander exercised full command of all ADSEC troops and installations with minor reservations, and maintained liaison with the United States Navy, the United States Air Force, and British troops in the area.

37. Normandy Base Section. In the development of Normandy Base Section the problems of port and beach development, port and beach clearance, together with the rehabilitation of the transportation system in the area directly affected the logistical support of the campaign because other ports were not released or rehabilitated as rapidly as had been previously planned.

38. Development of Ports 7-25 August 1944.

a. As it became apparent from the failure to take and develop the ports of the Brittany Peninsula that the maximum development of the Port of Cherbourg, the minor ports, and the Omaha and Utah beaches would be necessary in order to insure the uninterrupted flow of adequate quantities of supplies to the Army, it was essential that a more comprehensive organization be established to relieve ADSEC of those responsibilities and to coordinate all activities in the logement area. Therefore, on 7 August 1944, the Cherbourg Command (Provisional) was deactivated and Base Section No. 3 was established with US Headquarters at Cherbourg.

b. The initial mission was to develop the ports of Cherbourg, St. Vaast, and Barfleur; reception, staging, equipping, and prompt dispatch to their destination of incoming troops; development and operation

of Com Z installations and activities; command of Com Z troops; and assumption of additional responsibilities as they were released by ADSEC.

d. On the 16 August 1944, Base Section Number 3 was redesignated Normandy Base Section, and with the change in boundaries on 20 August 1944 the Utah and Omaha beaches came under the control of Normandy Base Section. (See Appendix 1).

d. The increasing troop movements arriving in the area together with the difficulties in coordinating the separate arrival of the troops and their equipment necessitated the formation of the Valognes Staging Area where troops could be held until equipped and until transportation was available for shipment forward. (Appendix 3)

e. As the ports of Brittany were still denied to the Allies by the enemy and the channel ports of Le Havre and Rouen were still in enemy hands, the bulk of the supplies received on the continent still had to come over the beaches and through the Port of Cherbourg. Small amounts were being received in the minor ports of Isigny, St. Vaast, and Barfleur but over 60% was coming over the beaches and through Cherbourg. Therefore it became apparent that maximum development of both the railway and highway nets in addition to increasing the tonnage unloaded in the ports would be necessary in order to assure a steady flow of supplies to the armies over rapidly advancing supply lines.

f. Actual tonnages of stores coming in over the two Normandy beaches for June and July were:

	June		July	
	Total	Daily Averages	Total	Daily Averages
OMAHA	180,365	7,215	365,280	11,785
UTAH	108,845	4,355	192,440	6,210

39 Major Development Plans.

a. On 18 July, six weeks after D-Day, the major port projects being considered for development were:

(1) Quiberon Bay (Code Name "CHASTITY"), 25 miles southeast along the Atlantic coast from Lorient. This was one of the discharge sites originally planned. Its capture by 15 July and development to 9,000 tons by 4 October were contemplated.

(2) Cancale, east of St Malo, in the Bay du Mont St Michel. This project was not in the original plan. It came into the picture as a proposed substitute for Quiberon Bay with the report of the "Spearhead" Committee on 20 July, which recommended the development of Cancale, as more economical and quicker than Quiberon.

(3) Brest and Rade de Brest (considered one port hereafter) were to be captured by 25 July and developed for 3,200 tons by 6 August and 5,300 tons by 4 October. The "Spearhead" Committee recommended the development of Brest for 1,500 tons a/day in addition to the personnel and vehicles intake previously planned, and the development of the rail exit to 12,000 tons a day.

(4) Mulberry "A", an artificial port to be operated by the Omaha Beach Command, was so badly damaged by storm soon after D Day that it was not considered worth repairing.

(5) Morlaix (Morlaix and Roscoff constituted a joint port) opened on 5 September (D plus 91) as planned. Development of this port and those of St. Malo, Granville, St Brieuc, and Cancale was authorized on 25 August. Granville became strictly a coal port, as also did St Brieuc, although both were planned for stores intake as well. Cancale, not included in the original planning, came into the picture as a supplement to Quiberon Bay, as to the over-all usefullness of which there was some doubt. Cancale was ordered abandoned before it opened, when it was decided to concentrate on ports further north and to open Le Havre and Rouen and to increase the capacity of Cherbourg.

39. Work on St. Malo, which the Engineers were preparing to produce 3,000 tons a day by 1 October, was stopped on 27 September by a change in plans, principally due to the rapid advance of the armies having increased the length of the supply lines. This deficit was partially offset by pushing the development of Omaha and Utah beaches to 12,000 and 8,000 tons respectively, a total of 9,500 tons above plan, by D plus 30, although early intake was far below this. Brest, Lorient, and Quiberon Bay, the latter counted on heavily to supplement Omaha and Utah Beaches, never were used. Brest was too badly damaged to be worth the expenditure of material and manpower necessary to make it usable. It also had the longest rail lines to the forward areas of any of the planned ports. Lorient and Quiberon Bay remained in German controlled territory until VE Day.

40. Of the planned intake capacity of 26,000 tons expected to be available by D plus 30, this much was missing at the end of the period:

Mulberry "A"	5,000 tons
Cherbourg	6,000 tons
St Vaast	1,000 tons
Barfleur	1,000 tons
Granville	500 tons
St Malo	1,000 tons
	14,500 tons

41. Estimate of Port Situation 30 July. An estimate of the port situation as of 30 July 1944, based partly on SHAEF data and partly on Com Z data, was prepared on that date as follows: (That part of the data which originated at SHAEF is indicated by (S) and data originating with Com Z is indicate by (OZ)). It was upon this estimate of the situation that the recommendation was made for the development of Cancale, the continuation of the development of Quiberon Bay, and an increase in the planned capacity of Brest.

PORT SITUATION ESTIMATE - 30 JULY 1944

	Capacity (Tons)			
	D/120 (4 Oct)	D/150 (3 Nov)	D/180 (8 Dec)	D/210 (2 Jan)
Required of all ports (S)	54435	63970	69385	74225
With capture of Brittany by D/ 90 and Seine ports by D / 120				
All ports northeast of St Malo (S)	35100	40200	40900	52500

Brest, Morlaix and St Malo (OZ)	9800	12500	16000	14200
Cancale (OZ)	5500	5500	5500	5500
Quiberon Bay (OZ)	2500	6000	6000	6000
Total	52900	564500	68400	78200

With capture of Brittany after D+ 90 and Seine ports not captured until 1945.

All ports northeast of St Malo (S)	35100	36900	38100	28100
Brest, Morlaix and St Malo (OZ)	6500	12300	16600	16600
Cancale (OZ)	--	5500	5500	5500
Quiberon Bay (OZ)	--	2500	6000	6000
Total	41600	57200	66200	56200
Deficit from requirements estimated by SHAEF.	11300	7300	2200	22000

42. Port Estimate of 12 August. It should be noted that the table of estimated port capacities, dated 12 August, which appears below, still indicated the hope of using Brest, Lorient and Quiberon Bay, and adds St. Nazaire and Nantes, these five ports being counted on for 16250 tons by 1 October, 27250 tons by 1 November, and 33750 tons by 1 December. None of these ports were ever used.

PORT CAPACITY (Estimate of 12 August 1944)

Port	1 Aug	1 Sep	1 Oct	1 Nov	1 Dec
Omaha	10000	13000	6000	4000	3000
Utah	6500	9000	4000	2000	1000
*Cherbourg	5000	8000	12000	15000	15000
St. Vaast	1500	2500	2000	2000	1500
Barfleur	1000	1500	1300	1000	1000
Carentan	1000	500	--	--	--
Isigny	1200	2500	2000	1500	1000
Grandcamp	1000	1200	600	300	300
Granville	--	2500	3000	3000	3000
St Malo	--	--	2000	2500	3000
Brest	--	1500	5000	9000	12000
Rade de Brest	--	--	3000	3000	3000
Lorient	--	1000	2250	2250	2250
Quiberon	--	--	3500	6000	8000
St. Nazaire	--	--	1500	2000	2500
Nantes	--	--	3000	5000	6000
Total	27200	43200	51150	58550	62550

*Cherbourg Capacity given excludes evacuation and reception of personnel and all other items over and above usable supplies. It could be further increased by the construction of quays. This suggested plan called for the use of phoenixes, or artificial piers.

43. a. A survey of the situation indicated that the beaches and small COMMENTIN ports were already materially affected by the weather, and would become increasingly so as the autumn storm season approached.

b. Granville. Capacity would have to be attained by coaster use. The anchorage was 6 miles from the harbor and there was also a serious mine clearance problem. Comparing the port estimate of 12 August (D +67) with the original plan shown previously it will be seen that St Brieuc and Morlaix have been dropped from consideration. Both the latter ports, were, however, reinstated in the plan of 25 August and came

into production, St. Brieuc as a minor coal port which was of relatively limited use. It will be noted also that tonnage was being brought in through Carontan, but that port never was of any measurable importance. Cancale was not yet firmed up for development.

c. All the discussion and planning came to nothing- the area which included Quiberon Bay was not taken, Brest when captured on D + 103 proved too costly in reconstruction to be worth the work, and Cancale was abandoned before it opened.

d. The planned capacity of all ports was now 35,940 tons, but the actual capacity proved to be 23,740 tons.

44. a. Planned Offset for Declining Beach Capacity. A study dated 18 August, made by Plans Branch G-4, noted that:

"After 1 October the wind and high seas will make Omaha and Utah Beach operation unprofitable. This loss can be offset by immediately opening the Brittany ports and the rapid development of Quiberon Bay. This is essential to meet the 51,000 capacity required by 1 October (based on the requirements to support 31 US divisions). It has been informally indicated that the British will require 5,000 to 10,000 tons capacity through Cherbourg by 1 October. This would seriously handicap US plans." (British cargo was not, after all, brought through Cherbourg.) The study's conclusion was: "If 50,000 tons capacity cannot be developed by 1 October and if the British commitment (in Cherbourg) is heavy, the consequences to the support of US forces might be serious." The recommendation was that necessary action be taken to hasten the capture and development of ports, including British ports. The emphasis was on the port of Caen for the British.

b. Beach Clearance. The discharge of ocean going ships necessarily was slower at the beaches than at the ports. The average discharge time for ships from 23 June to 9 November when beach discharge was concluded was 17.5 days. For the first week when beaches were not included in the statistics (week ending 9 November) the time dropped to 13.4 days. This included an average times at the three ports then operating of:

Cherbourg 13.6 days, Le Havre 12.7 days, Morlaix 13.6 days.

45. New Port Development Planned. As the prospects for Quiberon Bay, Brest and other ports between the Siene and the Loire faded it became necessary to look elsewhere. Development of five ports - Granville on the south and Morlaix, St. Brieuc, Cancale and St. Malo on the Brittany north coast was authorized to the Normandy and Brittany Base Section commanders on 25 August. Development was to be to the following capacities:

Granville - 5000 tons capacity (average 400 tons daily) for handling coal in coasters. The target date was 15 September, actual date was 22 September.

Morlaix - 3,000 tons of stores daily, from Liberty ships. The target date was 1 September; actual date was 3 September.

St. Brieuc - 2,000 tons of coal and 1,500 tons of stores daily, all in coasters; the target date was 3 September, actual date was 15 Sep.

Cancale - 3,000 tons of stores daily from Liberty ships (contingent on a report as to the feasibility of construction.) The target date was 5 September; actually it was not used.

St. Malo - 4,000 tons of coal and 2,000 tons of stores daily, all in coasters. The target date was 1 October; actually it was never used.

46. Morlaix Only Useful Port.

a. Granville never came near the tonnage target, its best month being November with an average of 1,625 tons a day. St. Brieuc received a total of slightly over 5,000 tons of coal, being closed down for such shipments on 26 October (up to which time it had worked coal coasters exactly 11 days) St. Malo never was used, development being stopped just as work neared completion. Cancale never operated, though Brittany Base Section on 1 September reported it able to take in 1,000 tons, with 3,000 tons by 1 October. Operating personnel were sent to the port, remained there idle for a few days and were withdrawn. Morlaix was a useful and highly efficient port for several months, closing on 14 December after taking in 213,660 tons of stores. (Appendix 2).

b. It also became apparent that Le Havre would have to be brought back into the picture and Cherbourg developed beyond planned capacity because of the vital necessity of having at least one "safe" port in case of the early closing of the beaches. The development of 18,000 tons discharge at Cherbourg was not achieved, the maximum intake on any one day being 15,685 tons on 4 November, which month also saw the maximum daily average as 12,295 tons. Had the planned development been achieved it would have done little to help the supply situation in forward areas, because not only was the terrain around the port unsuitable for a base depot area, being restricted by a ridge of hills east, south and west close to the city, but also the clearance of greater tonnage out of the port could not have been managed with the limited road and rail facilities at hand.

47. Le Havre Renovation Starts.

a. Renovation of Le Havre was begun early in September and a month later 12 anchorages were available and ship discharge commenced on 4 October with 820 tons for the day. The rest of the month produced a daily average of 2,190 tons. The inner basins did not become available until late December. Rouen was developed and discharge there began 16 October (Appendix 4)

b. Optimism. Le Havre and Rouen came near not being developed into ports, regardless of the failure of so much planned capacity to develop. As is noted elsewhere about this time there arose in many minds, including those at highest headquarters, a belief that the war would soon be over, or at least that France, Belgium and Holland would quickly be swept clear of the German Armies and their ports and other resources would be available to the Allies. Especially were their eyes centered on Antwerp, the possession of which would make unnecessary any further development in northwestern France.

48. Antwerp Expected Available by Mid-October.

a. It must be remembered that at this time, it was expected that Antwerp would be available by the middle of October, a happy dream which was postponed first to 15 November and then to 1 December (Actual opening 28 November). Much of the miscalculation of ship discharge and cargo movement which occurred later was due to the non-fulfillment of this expectation - just as so many other calculations went wrong because they were based on a very general expectation that the war would end before 1945. (For a specific example, the inattention to proper motor maintenance generally and on the Red Ball Express Route in particular, on the theory that burning up the roads - and the trucks - was justified, because it brought the end in sight).

b. A special reason for wanting Antwerp as soon as possible, aside from the ability it would give Com Z to discharge more ships, was due to its shorter rail and highway lines to the forward areas. Nancy, for instance, was 460 miles by rail from Cherbourg but only 250 miles from Antwerp. This matter of rails was strongly in mind in September since the rail capacity for discharge from Cherbourg and to the beaches was only approximately 10,000 tons per day against an average stores intake alone of 12,295 tons. The Red Ball Route was carrying a major tonnage burden to supplement the rails, but at a very heavy cost.

c. Peace Time Capacity. In 1937, Antwerp handled 57,800,000 tons including: 24,000,000 tons by sea, 18,000,000 tons by inland waterways, and 11,000,000 tons by rail.

d. Conclusions: "Nearly three times the effort is required to support one division by the Cherbourg route as compared with the Antwerp route. Assuming a sustained performance of the rail system, and the operation of the Red Ball Highways system at top capacity, a maximum of 21 divisions can be supported via Cherbourg, and only 9 to 13 division if the reserves included. On the other hand, the Antwerp route can support 30 to 50 divisions without difficulty" (Appendix 9).

49. Optimism was Premature.

a. Such optimism naturally infected Com Z. It promptly recommended to SHAEF that major port development be limited to that of Cherbourg and to the Channel or North Coast ports, that Le Havre should not be seriously considered because of the extensive damage there, and that Antwerp, Rotterdam and Hamburg be allocated jointly to US and British Forces. Just previously, the Ports Branch G-4 had recommended to Com Z, that, "It does not seem worth while attempting to open Rouen (unless for Civil Affairs), owing to obstructions in the Seine and the fact that Liberty Ships cannot work Rouen even if the Seine were open."

b. These opinions concerning Le Havre and Rouen very shortly were reversed by force of conditions, chief of which was that the tactical advance was well ahead of schedule. From 5 August to 25 August (D plus 80) the armies moved into new territory planned to be occupied in 120 days. By 6 September they moved forward through another 140 days of phase lines and on D plus 92 the front lines rested on phase line of D plus 280. At the same time the capture of suitable ports was behind schedule - and the obstinacy of the German forces holding the island controlling the entrance to the estuary forced the prospects of the use of Antwerp as a port further and further into the future, although this did not materially hinder the work on the rehabilitation of the ports itself.

c. It was believed that the Port of Antwerp would be available in October, then the time of availability shifted to mid-November. Finally it opened for business 28 November. The prospect and delays were harmful. The tantalizing hope of gaining Antwerp's huge discharge capacity and short lines to the front had colored Com Z thinking heavily and the color had been rosy.

d. The coming in of Antwerp on 28 November didn't in fact mark the beginning of the solution of one of Com Z's greatest problems-getting and adequate flow of goods into the Theater without a waste of shipping, and then distributing them over comparatively short hauls. Monthly requirements for artillery ammunition alone for Northern France were 6,000,000 rounds a month and for mortar shells it was 2,000,000 a month. The soldiers' clothing was wearing out at a rate incomprehensible to civilians. To feed the troops 1,750,000 tons of food must be shipped to the Theater from the United States before March, 1945. The vital wire for field

communications was another item whose consumption was far ahead of anticipation.

c. The discharge of supplies needed had not kept pace with the plan, and there was no usable port anywhere near the place where the supplies were needed--up with the armies. There were approximately 3,500 miles of railways in operation, but the railheads were close to 500 miles forward of the principal base of supplies in the Cherbourg area.

50. Requirements on a large Scale.

a. With winter approaching there was a demand throughout the Theater for 13,000,000 square feet of pre-fabricated buildings and for 80,000,000 board feet of lumber. The equipment needed to furnish water and electricity to the troops and to meet the barest essential needs of civilian population in areas occupied by US forces included more than 3,000 electric plants and about 1,000 water units - equipment which would light an American city of a million inhabitants and furnish water for another of 500,000 people. Almost unbelievable was the demand for paper for making maps. Three thousand tons had been required for D Day alone. For large size maps the army had been forced to acquire all suitable available paper from French sources, and in addition, to print 10,000,000 maps on the revers side of captured German maps.

b. This data shows incompletely, but strikingly, the magnitude of the supply problem faced by the American forces - a G-4 problem all the way from the American ports to the fighting fronts.

51. Port Capacity 30 September.

a. The planned daily capacity of all ports and beaches (at the end of September) was as shown in the following table. The actual tonnages discharged at major ports have been included in order to compare the plan with results. The notes after the table were part of the schedule of the planned capacities which was prepared by G-4 (Ports Branch) Com Z.

PLANNED DAILY AVERAGE CAPACITY IN TONS

Port	Oct	(Actual)*	Nov	(Actual)*	Dec	(Actual)*
Omaha	5,000	3,900	-	445	-	
Utah	3,000	2,210	-	430	-	
Cherbourg	18,000	9,090	20,000	12,295	24,000x	7,320
Isigny	1,000	-	-		-	
St Vaast	1,000	-	-		-	
Barfleur	1,000	-	-		-	
Granville	4,000	-	4,000		4,000	
St Brieuc	600	-	600		600	
Morlaix	3,000	2,345	3,000	2,150	3,000	880
Le Havre	5,000	2,190	7,500	4,605	7,500	5,370
Antwerp	-	-	15,000		25,000	13,795
	41,600	19,735	50,100	19,925	64,100	27,365

x After October, full capacity probably would not be used.
* Actual tonnage discharges, not capacity (See Appendix 5)

b. It was agreed to investigate Zeebrugge and especially Dunkirk, and to take immediate action to develop the maximum possible tonnage from Calais. Nothing came of any of this except that Calais came in use as a discharge point for 1,000 tons a day of pit props for the Pas de Calais coal mines. Calais also served from January 1945 as the

Continental end of Pluto, the British underwater pipeline from UK. The total intake of Pluto was 65,820 tons through June 1945 or 17.4% of the bulk POL landed on the Continent for US Forces during a years operation of the armies in Europe.

c. Le Havre came into production on 4 October, although the directive for its development had been issued only on 27 September. This called for its development under two priorities: (1) the immediate tonnage reception of 1,500 tons daily, from Liberty ships by the use of DUKWs or lighters or both; (Two DUKW companies were provided for this work.) (2) development to provided an increased tonnage up to 7,000 tons a day without any major reconstruction effort.

d. Utah Beach closed 13 November and Omaha on the 19th, and Morlaix shut down on 14 December. Of the smaller ports St Brieuc opened on 3 September, closed down in November; the others remained in operation for varying periods up to April, 1945. These ports worked coasters only.

52. Record of the Beaches.

a. During their life the beaches were the supply mainstay, Omaha accounting for 1,265,000 tons or almost 8,000 tons a day (despite storms which made it useless on some days) as against its initial planned capacity of 6,000 tons until D plus 30 and 5,000 tons up to D plus 120. In addition to supply stores Omaha passed over the beach 801,000 personnel and 123,965 vehicles. Utah's enlarged usefulness resulted from lengthened life rather than from an increase over the planned intake, as its total of 726,015 tons gave it an average of 4,000 tons a day or only a little more than had been planned. Utah also handled 801 801,005 personnel and 163,530 vehicles. (See appendix 8).

b. Troops and vehicles arriving over the beaches from 9 September to 6 November 1944 were as follows:

Beach	September Personnel	September Vehicles	October Personnel	October Vehicles	November Personnel	November Vehicles
Omaha	107,090	3,385	86,845	4,095	23,560	2,925
Utah	104,785	27,820	58,715	14,040	895	280
Cherbourg	56,315	1,515	50	2,705	645	935
Total	268,190	32,720	145,610	20,840	25,100	4,140

Total Personnel	Total Vehicles
217,495	10,405
164,395	42,140
57,010	5,155
438,900	57,700

c. The port of Cherbourg contained the following Berths on 15 December 1944:

28	Liberty
13	Coaster
75	Barge
14	Lst's
2	Twickenham Ferry
2	Tankers
134	Total

53. Ghent Interest Develops. After Antwerp, Ghent was the only other port developed up to VE Day aside from Marseilles, which SOLOC had cleared and operated thru Delta Base Section until Delta Base came under control of Com Z on 12 February, 1945. On 25 November a SHAEF letter stated "The First and Ninth US Armies and the Ninth Air Force will be largely based on Antwerp.... Ghent will be examined by the US as an alternate port, in part for Antwerp." An agreement with the British for the use of the port was signed on 15 January, 1945, on terms similar to those of the Antwerp agreement. Discharge of US supplies began 24 January 1945 and produced 15,500 tons during the remainder of the month. Thereafter daily tonnages rose to 2,490 in February; 5,535 in March; 9,740 in May, making Ghent the second most important northern port. The agreement for the use of Ghent provided for US intake of 7,500 tons a day, to be cleared primarily by rail and canal discharge.

54. Agreement for Use of Antwerp. Exclusive of bulk POL the US allocation was 22,500 tons and the British 17,500 tons of the ports estimated 40,000 tons discharge capacity. American tonnage was to be moved to depots in the Liege-Namur and Luxembourg area. US Storage was to be only of an intransit nature, cargoes to be moved from quayside to the advance depots. This didn't work at all because by the middle of December, there were 73,000 tons of import in storage andthis was increased to a peak of 157,775 tons on 2 February. Eventual segregation of cargoes, by ship, as they were discharged, facilitated the selection of items needed up forward.

55. Supreme confidence in the capture of Cherbourg on schedule, and ultimate capture and utilization of Brest, Lt Nozaire and Lorient, was evident and when it was not achieved, it was apparent that adequate alternate plans for other ports were not available. The delay in preparing the other ports to supplement Cherbourg interfered with an orderly accomplishment of the logistical mission. All advance planning estimates were over-optimistic. The optimism looking toward an end of the war in the autumn, 1944, resulted in inadequate over-all plans for port capacity. Changes in the major tactical plan required modification and improvisation necessary, accompanied by the inevitable confusion incidant thereto. Rapid advance of the tactical forces to the east stretched the lines of communications to a dangerous degree. Nevertheless the progress and development of the logistical units of Com Z is considered to have been so satisfactory as could possibly be expected, under the circumstances of changed plans and accelerated schedule of the entire operation far beyond anything which was anticipated.

CHAPTER 8

TRANSPORTATION

Motor Transportation.

a. Planning.

(1) As originally planned, the rate considered optimistic; but based upon the safety factor that any unpremeditated advantage should find the Allies in possession of sufficient extra troops, supplies and truck transportation with which to exploit that advantage. However, not until after the breakthrough at St Lo on 26-30 July 1944 and the rapid advance of the Armies, did motor truck transportation really come into its own and become the principal means of supply for the armies.

(2) The initial phase of transportation, was of necessity, that of the truck phase, in which supplies were pushed in right behind the fighting man and put into temporary dumps near the beaches. That soon expanded into the long-haul trucking phase, which bridged the period of emergency while the armies were advancing and while the railroad lines were being put into commission. Hence, the necessity that produced, "Red Ball" which is covered thoroughly under beach clearance in Chapter 9, par 9.

(3) During the trucking phase, mud was an early and continuing problem. The Norman peasant attributes the sturdy leg and shoulder muscles of his live stock to the exercise they get pulling through muddy soil. The troops who had to pull themselves and their vehicles through the same mud had reason to belisve that legend. 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 surface vegetation which might have served as a partial ground cover.

b. Vehicles on the Continent. The major portion of our forces' supplies came onto the Continent in the early stages of the invasion over the beaches and those supplies all required truck transportation. The actual receipt of vehicles through D plus 90 were as follows:

D plus 30	131,970
D plus 60	213,258
D plus 90	258,000

On 30 April 1945, there were 465,000 motor driven vehicles on the Continent.

c. Difficulties encountered.

(1) Despite the use of thousands of yards of pierced steel planking and Air Corps matting for solid standings 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 already had been greatly reduced in order to provide vehicles for the long-distance trucking lines. New vehicles often went onto the deadline within a few weeks with transmission badly worn by excessive use of the low gear and four-wheel drive. Brake drums were also destroyed by seepage of mud and grit into the inner surfaces.

(2) A tire shortage was made more acute by another serious 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 much of this material would have worked itself below the surface of the ground and stayed there. In the mud, however, it began churning about, cutting tires to ribbons. And in the mud the pierced steel planing 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 for a single night's work.

(3) 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 hard surface work with maximum pay loads. That, however, was not a surprise, for the Transportation Corps had known long before the invasion that all 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.

(4) Bulk oil products discharged on the Continent from D Day through 28 February 1945, amounted to 2,353,873 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 the ports to forward dumps in tank trucks. Almost all the motor fuel in the pipelines was picked up and moved by rail and truck in package form (5 gallon can) or in bulk (rail tank cars, or motor truck tankers with trailers). The only POL not moved by motor vehicles of the Transportation Corps at least once was that which was tapped from the pipelines for local use.

(5) At the end of 1944 the Transportation Corps was operating 198 Quartermaster Truck Companies or a total of some 9,500 vehicles. Fourteen of the companies were POL tankers.

d. General Purpose Vehicles Requirements for Rhine Crossings

Date	Total Requirements	On Hand 1st of Mo.	Shortages	Unserviceable	Total Shortages
	Rcs				
1 Jan	450,610	432,110	18,500	14,865	33,365
1 Feb	461,095	446,510	14,585	15,360	29,945
1 Mar	479,885	456,610	23,285	15,725	39,010

In addition to the requirements stated above, there were required 1,595 10-ton semi-trailers; 1,860 4-5 ton truck tractors, 540 2000 gallon, fuel servicing semi-trailers and 500 trailer convorter dollies (Fuel servicing), a total of 4,495 special type vehicles. All requirements stated were computed on the assumption that the Rhine would be crossed before 1 April followed by rapid movement forward - and that there would be no railroads beyond the Rhine, with a consequent heavy load on motor transports.

e. Accomplishments.

(1) Between 16 December 44 and 6 January 45, at the height of the crisis of the German counter offensive near Bastogne, there were transported 67,230 troops and 10,000 tons of supplies over an average distance of 100 miles from the Mourmelon district to the vicinity of Bastogne. That work was done by only 220 two and one-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.

(2) From 11 February to 11 March 1945 during the Rhine crossing build-up, there was hauled altogether 2,786,750 tons of supplies and 1,011,775 soldiers over the military highways to forward areas. To accomplish this many trucks from 2½ tons vehicles to heavier and more practical 10 ton and 12½ ton semi-trailers and 45 ton trailers were used. These Diesel powered vehicles hauled anything from rations to locomotives.

(3) Despite the fury of the German attack following the Ardennes counter-offensive supplies were kept going forward so steadily by truck that less than 20% of the troops of the First Army had to go onto emergency rations during any part of the 20 day crisis.

f. Conclusions.

(1) Thus it was really apparent that the use of truck transportation is the support of the armies played a most important part in the final result; victory for the Allied Forces.

(2) The tail cannot wag the dog, therefore careful advance planning must be accomplished and carefully checked, and adequate provision made for a sufficient number of truck companies to support the campaign in its initial phases and also to allow sufficient time for the rehabilitation of railroads and pipelines to relieve the burden of truck transportation, so that the motor transport may be reserved for that emergency, which is likely to arise in any modern day military campaign.

57. Development of the Railroads.

a. Advance Planning.

(1) The plan for railroad construction and repair provided for the initial repair and reconstruction of essential continental railroads in the Zone of Operations. One item that ran far, far ahead of the plan was the unexpected extent of the useable railroad trackage. Despite battle damage, the bombing by our own Air Force and sabotage by the French which was intended to hinder the enemy from bringing up supplies and reinforcements, and by rehabilitation or outright capture there was acquired many times the trackage which had been expected. One unusual factor was the almost complete absence of comprehensive rail demolition by the Germany Army. Another, which exceeded rehabilitation of the war torn rails, was the discovery of such large resources of materials ready at hand that the greater part of the repair materials which had been requisitioned on special railroad projects was not required to be brought across the Channel. The table which follows shows the fortunate situation as to rails which, while not of major moment in the movement scheme in the early stages (demolition executed by the Germans on tunnels, bridges and other bottlenecks) prevented ready utilization of most of the trackage for some time and necessitated organization of the Red Ball Highway Express for major forward transportation of supplies was of importance later, when the shift from highway truck transport to rails for the major supply movement was inaugurated early in November.

(2) Table of Planned and Actual Trackage.*

Type Track	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
	D plus 30		D plus 60		D plus 90		D plus 120	
Single		37		794		1,460		2,926
Double		35		211		1,674		3,318
Total Miles	47	107	304	1,216	511	4,808	757	10,162

* Trackage does not include Southern France Operation.

(3) Rail tonnage handled.

Sept 1944	150,000 tons	:	Nov 1944	440,000 tons
Oct 1944	335,000 tons	::	Dec 1944	328,000 tons

(4) The principal assumptions on demolition were that 75% of track and 100% of the bridges would be destroyed, and that reconstruction of lines would require 55% new ties and rails and 90% new bridging material. Actually only the conditions in Cherbourg approached being as serious as were contemplated. Other than the damage to the Carentan and Lison Yards by aerial bombing, there was only minor damage to the main line track between Cherbourg and Lison Junction. There was no evidence of deliberate track demolition by the enemy outside of Cherbourg. Actually only four principal bridges between Cherbourg and Lison were destroyed,

amounting to about 410 linear feet. This lack of extensive demolition on the main line and the relatively stabilized situation made it possible to do far more work in Cherbourg than was originally planned. In addition, a single track line to the port of St Vaast and a single track line from Sottevast to St Sauveur were opened.

(5) Rail lines forward were not operative until mid-August. Even though some equipment was available and some lines were in operating condition they were not in the direction of the traffic flow. The first rail movement sending supplies forward took place when the rail and demolished road bed between Countances and Folligny were repaired and, about 12 August, it was decided to send 32 trains over the hastily reconditioned single track to Le Mans, which was completed 15 August. The first six of these trains arrived at Le Mans on 17 August.

(6) Immediately after the breakthrough at St Lo about 1 August 1944, railroad construction became a primary, rather than a secondary mission. All effort was concentrated for three days on a single track line to Le Mans, which was opened to traffic 15 August. With the rapied advance of the First and Third Armies, the enemy now had little time for either partial or thorough destruction of the rail system, the damage encountered consisting principally of the demolition of a few major bridges, incidental damage due to artillery fire and wrecked trains, and extensive damage to a few railroad yards, which had been done by allied Air Forces.

(7) During the last week in August, work was underway on almost all lines between Pontaubault and the Seine River. The line Pontaubault-Le Vivier Del-Rennes-Le Mans was opened with the completion of the bridges at Pontaubault and Laval. A single track line into Paris was opened. The main double track line Vire-Argentan-Dreux-Versailles-Juvisy and a crossing of the Seine at Juvisy were being pushed. By the end of the period 20 September the rail lines had been extended as far north as Liege and to Nancy in the South by a well connected system covering the entire area from Cherbourg thru Paris to these points.

(8) All bridges over the Meuse River had been demolished, the Marne river bridge at Vitry had also been demolished, and on the Moselle River at Toul and the Orne River at Conflans at this phase grew to a close; the rail net had been extended to Metz and as far as Toul on the line towards Nancy. Construction was under way on the bridges at Liege, Verdun and Toul.

(9) In the fifty days since the breakthrough at St Lo, a total of 3,355 miles of track had been rehabilitated and 36 bridges, averaging 106 feet in length had been reconstructed.

(10) The heavy rail traffic from the beaches thru Paris and Reims and from the Channel ports was causing great difficulties in the handling of cargo, and it was therefore necessary to provide another bridge across

the Meuse River. Pont Remory viaduct was selected for reconstruction since it would give easy access from Brussels and Antwerp to the Kinkenpois yards in Liege and from these points connections were available to the main lines into Germany. All this work was completed on 24 January, thus providing another route for the flow of supplies into Germany. (Appendix 7).

b. Difficulties of Rail Transportation Equipment.

(1) The pre-war French railroad system consisted of 14,640 serviceable locomotives and they had 404,160 serviceable cargo wagons. On D Day the French railroads system had only 7,613 serviceable locomotives. On 1 May 1945 there were 8,320 serviceable locomotives and 161,175 serviceable wagons. As of 1 May 1945 there were approximately 1300 US locomotives and approximately 31,000 US wagons on hand that had been brought to the Continent to augment the rolling stock of the railroads. The locomotives are a special type, known as the "280", an engine built for a short life, for military purposes, and is not a standard American engine. The wagons are also of US military design, of all types, such as tanks, box cars, gondolas, and flat cars. These wagons are not a standard American car.

(2) Car loadings in May 1945 were approximately 36,000 per week; of this total about one third of the French loadings went to the US Forces in France and considerably more than that percentage went to the US Forces in Belgium.

(3) The rolling stock shortages, as always present in a war theater, combined with undue concentration in certain areas created a temporary congestion from time to time and was one of the difficulties in distribution of supplies. Another difficulty was during the very cold spells of the winter of 44-45 when one French type locomotive could not handle a train and had to be reinforced by an American locomotive to successfully accomplish the mission. Also another difficulty was the shortage of the right types of cars needed at the right place, causing undue usage of the wrong type of car for the wrong commodity, hence resulting in undue loss of tonnage.

56. Supply by Air - early Stages.

a. Airplane transportation was utilized to considerable extent to supply the forces during the early stages of the invasion. Air movement accounted for these tonnages representing emergency supplies:

Service	D-D/25	D-D/80
Medical	13 tons	785 tons
Ordnance	1,315	4,731
Signal	29	530
Engineer	18	453
Quartermaster	1	4,591
Chemical Warfare	2	24
Total	1,378	11,174

b. The Quartermaster tonnage represents largely emergency shipments of gasoline to keep the forward drive going. Up to 16 July, a week and a half before the break through, Quartermaster tonnage totalled only one ton. The next five weeks saw 4,591 tons delivered by air.

c. It was not until September that the rapid movement of the ground forces eastward, and the resulting extended lines of communication, called for a maximum air-supply effort. The tonnage of freight lifted during this month represented approximately half of the air lift from D Day to 30 September. There were 5,580 sorties flown in support of US forces, flying 12,745 tons of POL, 270 tons of Ammunition, and 2,295 tons of miscellaneous supplies, the latter including 1,240 tons of food for the relief of Paris.

d. Emergency air lift between 1 Oct and 18 Nov 1944 was 3,453 tons of critical items of supply necessary for the armies.

e. Chapter 19 covers Supply by Air, to include VE Day.

59. Inland Waterways. This feature of the transportation system of all of Western Europe is of such a unique nature that it is contained in Chapter 20 exclusively. There is no such comprehensive system anywhere else in the world, and its value, as a supplementary mode of transportation was of such extreme importance at critical times it is considered worthy of special delineation. In the continuity of this report it is also considered out of place until phases later than the first 3 months. Consequently, it is omitted here.

CHAPTER 9

BEACH, PORT AND DEPOT CLEARANCE

60. Supplies in Open Storage. Before the invasion general areas had been allotted to each Supply Service for sitting installations and bivouacs. Each Service picked certain areas in the rear of Omaha and Utah beaches and in the vicinity of Cherbourg. Covered storage being lacking, open fields were used for storage, in the main. Approximately the only covered facilities in use until after the St. Lo breakthrough on 26 July 1944 were the Amoit Aircraft Plant in Cherbourg, which was used as an Ordnance Class II and IV depot; some inside storage for Quartermaster Class I in Cherbourg, and an Ordnance maintenance shop in a French airdrome southwest of Montebourg. Up to the time of the Third Army breakthrough on 26 July, because of the limited territory occupied by our forces, ADSEC, First US Army and US Air Force installations frequently were side by side in the same area, and in many instances, installations were operated jointly by ADSEC and First Army troops, usually under Army control.

61. Dumps Jammed Up Behind Beaches. With the advance inland developing neither as rapidly nor as deeply as planned the dump and maintenance area were limited to a relatively narrow strip served by a single road. Improvements on the beaches enlarged their capacity to handle tonnages while the available space steadily diminished. This congestion was especially troublesome in the case of ammunition, there being insufficient space for proper dispersal in the interests of safety. There was insufficient personnel to permit tinely, expeditious sorting in order to make any specific item quickly accessible. Heavy rains later created large areas of mud which further handicapped selectivity of suitable areas. Lastly, the restricted road net in dump area and the relatively small fields involved seriously restricted the tonnage that could be outloaded at any one time. This congestion, which extended to all types of supply, was unavoidable under the tactical conditions. Additional personnel to work the dumps, however, would have been useful, as POWs were not available, they having been evacuated to the UK for security reasons. Some German Todt workers, thoroughly screened, were used to considerable advantage; but their number was relatively small.

62. Plans for Improving Beach Clearance.

a. Omaha Beach intake as well as that from Isigny, Grandcamp and Carentan flowed into the dump area south of Trevieres. The supply intake from Utah Beach went to the Chef du Pon area. At the end of July plans were made to develop these areas to expedite outmovement of supplies from the beaches. At this time tonnage which had piled up behind Omaha Beach was roughly 300,000 tons and behind Utah Beach about 70,000 tons. The solution for Omaha supply movement forward was to develop the Trevieres area as a sorting area by building a four lane, hard-surfaced road from the beach into the area, and to hard surface the exits from the area to on-loading tracks adjacent to the Lison-Bayeux rail line. Similar treatment was to be given the Chef du Pont area, which would on-load to the main rail line between Montebourg and Carentan.

b. This plan was not carried out. The main reason was the mud, which indicated slow and costly construction and heavy maintenance. Instead, the existing roads from the beaches and to rail sidings were maintained so as to handle heavy traffic; the Engineers built Le Molay siding on the Lison Bayeux line to handle Omaha outmovement, while Utah's outloading was done on existing sidings in and near Carentan. The rapid forward movement of the combat forces took the emphasis off the rails (which could not handle the required traffic at that time) and beach

dump supplies were cleared forward to a major extent by the Red Ball Highway Express, a major trucking operation which is described elsewhere in this report.

63. Succession of Storage Areas.

a. Following the 26-29 July break through at St Lo the advance alleviated the shortage of storage areas behind the beaches. The next planned maintenance area was Vire-Villedieu. This was developed only for some ammunition and QM supplies as the rapid movement forward left the area too far in the rear to be of much value and the terrain was unsuitable. The next maintenance area was at Le Mans. Again, the forward movement made it possible to develop the area only partially. It was used largely for Ordnance, Quartermaster and Engineer maintenance.

b. After Le Mans came the Chartres area. While this was not well suited to storage because of extensive wheat fields, dry weather permitted use of uncultivated areas, and considerable quantities of all classes of supply were stored in the open. The only covered storage available was in Chartres proper, about 200,000 sq feet of it; but the Ninth Air Force earmarked all useable buildings for its own purposes (though it never used them.) Consequently, many valuable Engineer and Signal items were forced into open storage.

c. In this phase ADSEC retained issued responsibility for bulk supplies, although the issue of controlled items had reverted to Forward Echelon, Com Z.

64. Engineers Over, Quartermasters Short. During the period of the invasion just described there were surpluses of some items of supply and shortages of others. For instance, in and around Valognes lay approximately 200,000 tons of Engineer materials, most of which were unlikely to be used because we had captured and put into use considerable quantities of German materials. On the other hand, Quartermaster Class II items such as individual equipment were short because replacement was running unexpectedly heavy — about 2½ times the War Department replacement factor. Troops discarded such equipment in large quantities, especially during the heavy fighting in the hedgerows. Many troops going into action for the first time suffered from shock and were found wandering around in a dazed condition without any individual equipment. Also, rations were being used up so rapidly that about 30% above normal requirements were needed. The Armies were receiving about two-thirds of this excess, according to an authentic estimate, but one third was accounted for by waste and pilferage — roughly 10% of the total consumption.

65. Supply Responsibility First Army's.

a. The primary responsibility for supply of all forces ashore on the Continent from D Day to the establishment of the First Army rear boundary - which occurred on 19 July 1944 - rested with First Army. All Com Z troops were attached to First Army, which directed all operations relative to the initial development of the beach maintenance area. During this period the Advance Section, Communications Zone (ADSEC), was preparing to assume responsibility for the Communications Zone supply functions with establishment of the First Army rear boundary. It's G-4 function consisted of maintaining direct liaison with the First US Army the Ninth Air Force and the Supply Services of Communications Zone, gradually taking over supply installations from the First Army and implementing the supply procedures and policies which had been established by Com Z and establishing ADSEC installations within the Forward Boundary of ADSEC as defined by the First Army.

b. In the initial phase all supplies were received on the con-

tinent by First US Army, based on pre-scheduled supply requirements. Emergency and supplementary requirements were requisitioned by the Army from UK for shipment by air or by coasters operating under Red Ball Express. Supplies were received over the beaches and placed in the Army's field depots and dumps. Issues to all Army, ADSEC, Air Force and miscellaneous agencies were controlled by the First Army.

66. Supply Responsibility to ADSEC 19 July.

a. After establishment of the First Army rear boundary full responsibility for direct support of the First and Third Armies and of the Air Force reverted to ADSEC which, charged with execution of the Communications Zone function, assumed direct control of all supply installations including beach maintenance areas operated by Engineer Special Brigades, port areas, development of the pipeline system for bulk supply of gasoline, and the receipt, storage and issue of supplies.

b. Supplies continued to be received against pre-scheduled requirements, issues to the Army and Air Force units were made in bulk from base and field depot installations operated by ADSEC. Issues of controlled items were authorized by ADSEC, which also had the function of handling emergency RED BALL EXPRESS (special coaster service from UK) and Air Express requisitioning.

c. These functions, except issue of bulk supplies, reverted to the Forward Echelon Com Z on 7 August, together with the planning and operational instruction for bulk POL storage and distribution.

67. a. First US Army Supply Status Before the Breakthrough.

Reserves as of 18 July were as follows:

Class I	19.0 D/S (Days of Supply)
Class III	11.5 D/S
Class V	
Small Arms	13.3 U/F (Unit of Fire)
AA	13.3 U/F

b. Levels of supply for all troops on the Continent for 25 July were:

Class I	18.5 D/S
Class III	9.0 D/S
Class V	
Small Arms	15.1 U/F

c. A report by Forward Echelon Com Z on supply procedure as of the last week in July describes it as follows:

"ADSEC is operating the supply dumps and depots in the Utah "Beach Area.

"FUSA operates the dumps and depots in the Omaha Beach Area.

"FUSA, from the supply installations it operates, is supplying itself and certain units of TUSA which are attached to FUSA: when requirements indicate the necessity supplies are obtained from depots under ADSEC's control.

"ADSEC Units, Ninth Air Force, TUSA (except those units attached to FUSA), Com Z and Twelfth Army Group look to ADSEC for supply. Requirements in general are served out of installations operated by ADSEC."

68. The Red Ball Highway Express.

a. The swift advance of our armies to the eastern boundary of France following the St Lo breakthrough on 26-29 July 1944, created a critical supply situation. To maintain a continuous pressure against the enemy, the army required increasingly more supplies to be delivered over rapidly expanding lines of communications. The Armies placed bids for 72,000 tons of supplies to be delivered to their dumps at Dreux and Chartres between 26 August and 5 September 1944, but the damage to the rail net by Allied Air bombing and the lack of rolling stock indicated that this tonnage could definitely not be delivered by rail. Therefore it was necessary that a system be inaugurated for delivery by motor transport.

b. To meet this situation, the "Red Ball Highway Express" was organized, initially composed of 97 truck companies. These trucks travelled twenty-four hours a day over designated one-way highways exclusively reserved for this operation, and succeeded in delivering 74,585 tons by the 5th of September to the dumps at Dreux and Chartres. The initial success of this experiment resulted in the increase of "Red Ball" to about 7000 trucks or 140 trucking companies which at the operation peak were carrying nearly 8000 tons of supplies per day.

c. During the initial stages of "Red Ball", the equipment, trained supervisory personnel, and essential time were not available to permit the performance of ther than first and second echelon maintenance. This condition was later partially alleviated by reallocation of equipment and personnel to estsblish "Super Service Stations" where both first and second echelon maintenance could be expedited. Nevertheless, the deficiencies in preventative maintenance, together with the deterioration of the highways and constant rains which turned the roads to seas of mud brough the "Red Ball Express" to a close on 13 November. In a little over eleven weeks of operation a total of over 334,000 tons were carried by the Red Ball Highway Express. (Appendix 8)

d. The arrival at Cherbourg of railroad engines and rolling stock and the splendid efforts of the Transportation Corps and Engineer troops enabled the rail tonnages in September to exceed truck tonnages, and to steadily increase during the next month to a capacity where the bulk of all tonnage commitments could be made by rail.

69. Stock Control Procedures.

a. The stock control procedures, as prescribed by ETO SOP #13 went into effect a few days after Army installations were turned over to ADSEC. The procedures, with slight modification, remained in effect in ADSEC until, on 7 August, attached stock control personnel reverted to Headquarters Forward Echelon, Com Z, together with the responsibility for maintaining master stock control records. ADSEC however, continued to use a modification of the basic system and reported on controlled and critical items daily to G-4 at the Forward Echelon.

b. Unfortunately the stock control system did not work out as anticipated. Pressure to get tonnages unloaded and in across the beaches forced personnel in the dumps to devote full time to the physical handling of supplies. The volume of supplies being landed was so great that stock control personnel was inadequate to keep track of it. Difficulties in circulation, and a recurring necessity to shift first priority attention from one critical item to another, also contributed to the complexity of the task.

c. An element that further complicated the stock control procedure was the habit of First Army units (while the Army was in control) of driving convoys up to a dump, loading with wanted supplies and driving off without presenting proper requisitions so that the out-loading would become a matter of record. The quantities thus substracted from stocks

on hand later became important in Theater resupply, since the Supply Services' records showed larger quantities in Theater dumps and depots than actually existed and therefore these quantities, when reported to the New York Port of Embarkation (NYPE) decreased by so much the quantities automatically sent to the Theater for resupply of Material Status Report items.

d. The first time any definite and detailed knowledge as to quantities of supplies in Com Z's Continental area became available was after Com Z on 13 August directed the Chiefs of services to make complete inventories of all dumps and depots in Com Z with special stress on those taken over from the Armies and on the beach depots and dumps. Weekly inventories were directed to be made thereafter. Inventories of some dumps taken over from First Army previously had already been made by ADSEC.

e. It should be noted here also, that reports of battle losses from the front were for some time virtually non-existent, and this also handicapped resupply of MSR items.

f. Elsewhere has been noted First Army's relative disinterest in furnishing supply data needed by Com Z, such as reports of battle losses and reports on quantities of materials salvaged. The Army's concentration of fighting is understandable, but its failure to maintain normal records and to follow proper documentation procedures contributed unnecessarily to the difficulty experienced by Com Z in keeping adequate supply records.

g. That this lack of general information was due partly to First Army's not having passed on supply data to ADSEC is suggested by an entry in the 25 July journal of the assistant AC of S G-4, Forward Echelon, Com Z. Referring to the inability to supply the wanted information he notes, "Colonel _____, acting chief of the supply branch of G-4 of First Army interested himself in our problem to the extent of contacting G-4 of First Army in an effort to arrange a more free exchange of information between FUSA's Services and the Services of ADSEC".

h. Investigation of ADSEC's information resources disclosed that headquarters did not have the necessary records from which the essential supply and logistical data could be obtained. The office of First Army's G-4 was visited to see if data could be obtained there. Quoting a staff officer's report on this visit, "It was discovered that FUSA G-4 does not keep records which would furnish the necessary supply tonnage data either on a basis of consumption to date or expected needs in the future".

i. The inevitable result was that dump commanders did not have adequate knowledge either as to what they had in their dumps or as to how much there was of it. This must, to some extent, have handicapped higher headquarters in both arriving at and executing supply decisions.

j. The adverse weather conditions in October and the first portion of November increasingly retarded unloading operations of the Utah and Omaha beaches and turned both dumps and roads into areas of mud which were well nigh non-maneuverable so that it was necessary to close operations of these beaches on the 16th and 19th of November respectively.

k. During the five months of operation of the beaches, without the normal unloading facilities, the following totals were discharged:

	Utah	Omaha
Cargo Tons	726,315	1,267,325
Personnel	792,600	801,255
Vehicles	163,140	122,740

1. After the Omaha and Utah beaches closed down in mid-November, for the two weeks remaining prior to the opening of Antwerp the only important stores intake from ships was at Cherbourg, Le Havre, Rouen and the minor but very efficient port of Morlaix, which, during this period, averaged 2,425 tons daily. Total discharge during the two weeks' gap averaged 26,585 tons of which almost half was accounted for by Cherbourg. With Antwerp taking in a daily average of 13,795 tons for December (high day of 22,810) Morlaix was not needed, and was closed on 14 December.

70. Delay in Receiving Ships Manifests.

a. Another partial breakdown of control was in the matter of documentation of ships cargoes. It was planned that shore forces should know the contents of each ship and be familiar with its loading plan. This was essential if the ships with the most wanted supplies were to be brought forward for discharge to meet the immediate need for supplies and equipment in the order and quantity required.

b. Ships' manifests were to have been sent to the Continent by dispatch boats so they would be available for reference before the vessels arrived. It didn't work that way, in many instances, however. Ships arrived off the beaches before their manifests were delivered. Sometimes the manifests did not arrive at all. An instance suggestive, although hardly typical, of the results of this condition is the case of the 81mm HEL ammunition, which was urgently needed in the hedgerow fighting in Normandy. Inability to lay hands on the stocks of this ammunition in the ships lying off shore resulted in the calling up of practically all of the ammunition in the UK until at one time there were 145,000 tons of all types lying off shore--and even then it was necessary to search, ship by ship, to find the desired type.

71. a. The following table shows the Planned Ports and their Capacity to D plus 120.

PORTS	CAPTURED DATE		CAPACITY							
	Planned	Actual	D plus 30		D plus 60		D plus 90		D plus 120	
			Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
Omaha	D	D	6000	12000	5000	10000	5000	10000	5000	4300
Mulberry"A"	D	D	5000	-	5000	-	5000	-	5000	-
Isigny	D	D	500	500	500	1300	500	800	500	1000
Grandcamp	D	D	300	500	300	900	300	310	300	-
Utah	D	D	4500	8000	4000	6000	4000	4600	4000	3300
St Vaast	D+2	D+17	1100	-	1100	1300	1100	1300	1100	1400
Barfleur	D+6	D+17	1000	-	1000	640	1000	1100	1000	1300
Cherbourg	D+8	D+21	6000	-	7000	5600	8000	7600	8000	10000
Granville	D+17	D+57	700	-	1500	-	2500	-	2500	640
St Malo	D+25	D+73	900	-	2500	-	3000	-	3000	-
Brest	D+50	D+103	-	-	1800	-	3600	-	3600	-
Rade de Brest	D+50	D+103	-	-	1440	-	1700	-	1700	-
Lorient	D+50	-	-	-	800	-	2250	-	2250	-
Quiberon	D+40	-	-	-	4000	-	7000	-	9000	-
St Brieuic	D+40	D+69	-	-	-	-	500	-	1000	1000
Morlaix	D+50	D+69	-	-	-	-	1000	-	1800	3000
Roscoff	-	-	-	-	-	-	-	-	-	-
	Totals		26000	21000	35940	25740	46450	25710	49750	25940

b. The following table illustrates the relative importance of the beaches and ports in the ETO as to overall discharge of army cargo (6 June 1944 to 31 July 1945).

	TOTAL CARGO (tons)	PERSONNEL	VEHICLES	FROM UK CARGO (tons)	% UK CARGO
Omaha	1265000*	801000	123965	678825	53.7
Utah	726015	801005	163530	411185	57.0
Cherbourg	2798500	99560	26530	945030	31.6
Le Havre	1821715	1135755	82420	213905	14.0
Rouen	1277855	82230	43125	962090	75.3
Antwerp	3666365	330	27405	247740	6.8
Ghent	1138500	65	435	842245	74.0
Minor Ports	854720**	2165	2435	618880	72.4
Southern France	4726190	839450	177080	Not Incl	-
TOTAL	17974860	3761560	646925	4920900	8.1
Bremerhaven	173485			14660	
	18148345			4935560	

* Operations ceased by the middle of November 1944.

** Brittany ports, through which came 10% of this cargo ceased operation in November 1944. The last port ceased discharge April 1945.

c. 18,148,345 Tons !! Converting the above total figure, you will have capacity loads for:

3629	Liberty ships, or,
1814835	Rail cars, or,
40610	Trains, or
3629666	Trucks

72. Port and Depot clearance (13 December 1944 to 31 January 1945)

a. As the opening of the Channel Ports of Antwerp, Le Havre, and Rouen provided shorter supply lines and reduced the dependence upon the ports of Normandy, emphasis was placed upon port clearance, depot clearance, evacuation of wounded personnel and termination of the functioning of Normandy Base Section - primary emphasis being of port and depot clearance.

b. The acute deficiency in land transport during the previous phases made it impossible to clear all supplies from the port area of Cherbourg and the dumps immediately to the rear of the beaches. The opening of other ports enabled the discontinuance of unloading ships by amphibious trucks, and consequently, the inauguration of direct ship to rail unloadings combined with the delegation of port clearance to the Port Commander, cleared the congestion in the port area. The Port Commander was aided materially by being given command of the depot installations which received this tonnage.

c. The fall and winter weather had turned most of the field depot area and many adjacent roads to huge, almost impassable areas of mud. Therefore, it became increasingly necessary that these field installations be cleared, much of the supplies reconditioned, and a consolidation of depots be made.

73. Conclusions are contained in the narrative of this chapter, in order to prevent repetition of factual data.

CHAPTER 10

ANTWERP AND OTHER PORTS

74. The guiding principle in the planning for the use of the port of Antwerp was that the supply system must be kept in motion with full "pipelines" while the transition to Antwerp progressed. This was necessary because of uncertainties of fog and mine conditions in the entrance channel and the effect of "V-1" and V-2" activity in the Antwerp area. It was necessary, therefore, to plan for a transition procedure that would allow supplies to continue to move forward from existing sources while the new source of Antwerp proved itself.

75. Port Analysis. Port discharges before and after Antwerp opened were as follows:

Port discharges - Stores only - (Exclusive of coal and bulk POL)

Port	Actual Average Daily Discharge in Tons for 10 day period ending-				
	Nov 10	20 Nov	30 Nov	10 Dec	14 Dec
Morlaix	2525	2350	2530	2560	1720
Cherbourg	12150	12430	12095	11370	10950
Le Havre	4440	4010	5130	5125	4885
Rouen	3935	4030	4085	4295	3360
Omaha	900	480	Closed	-	-
Utah	925	Closed	-	-	-
Antwerp	-	-	-	10250	23130
Total	23875	23300	23840	33600	36095

Port	Average Est. Discharge 31 Dec	Actual Discharge Avg 25-31 Dec
Morlaix	Closed	-
Cherbourg	6000	5665
Le Havre	5500	6055
Rouen	5000	2650
Omaha	-	-
Utah	-	-
Antwerp	22500	14300
Total	39000	28670

76. The conclusion was arrived at by G-4 that the only solution for the problem of getting enough of the right supplies off-loaded to support the Armies properly was to obtain, without delay, a minimum of 25,000 tons daily through Antwerp.

72. The coming in of Antwerp placed emphasis not on quantities reaching the Theater but on quantities being pushed toward the front, and the problems incident thereto. Even with the southern armies to support after Southern Line of Communications was absorbed into Com Z the following February (up to that time the southern supply operation had been independent) there was no lack of overall tonnage. Marseilles, the second largest French city and the country's largest and best port, discharged 10,000 to 12,000 tons a day to supplement northern ports. Problems of overseas supply after these major ports opened were in connection with specific items such as vehicles, ammunition, guns and planes.

78. Type loading not satisfactory. Armies had been receiving only rations, POL and ammunition in any appreciable tonnages, despite the great demand forward for all types of supplies. The fact that ships discharging had been not loaded for the type operation then being conducted

and the fact that the armies had to be selective in calling supplies forward made the situation acute at the beaches, because considerable supply cargo had to be discharged and handled at the dumps, of which amounts only a small portion might be moved forward. An example of this was the case of 19 Engineer ships called forward which had, altogether, only a few hundred tons of the most urgently required maps. To get those maps, thousands of tons of low priority cargo had to be handled. Another case was when a considerable number of ships had been loaded with supplies and equipment for development of projects by now forgotten. This was especially to be noted in Engineer tonnages, where materials designated for fortification purposes were rendered unnecessary by the St. Lo breakthrough 26 - 29 July and the rapid pursuit of the enemy. The supply plan and timing had, necessarily, been based on the tactical plan and its timing. When the latter went askew, the former followed perforce -- with unfavorable weather playing an important part in further complicating the business of readjusting early hopes and plans to the stern realities of the campaign.

79. The condition of future supply to the forward areas promulgated the following summary; as far back as 7 August 1944.

"The present operation in France requires a change of ocean bases and the transshipment of United States armies of well over a million men during actual combat, a feat being attempted for the first time in history. Development of ports in France is obviously contingent upon tactical progress and the elements. Weather conditions have retarded progress. Each day of bad weather causes a loss in cargo discharged of approximately 15,000 tons besides delaying towing of floating equipment to France. Discharge at French ports is essentially of lighterage nature since quays do not exist. To date, no barges or tugs have been captured."

80. The general shipping situation in the Theater at this time was as follows: Tonnage discharge was building up satisfactorily at Cherbourg, and small but regular tonnage was coming through Morlaix. Le Havre, however, had not yet become a producer by reason of the necessity of clearing mines from the harbor (five ships were blown up there during September, October and November) and reconstructing shore facilities. Neither had Arromanches. While Omaha and Utah beaches continued to off-load considerable tonnages, they were not going to be able to do so very much longer. In fact, during the first half of October, storms said to be the worst in 80 years swept the coast and reduced the beach discharge materially, while heavy rains in the adjacent areas created large tracts of deep mud which made beach clearance a slow and arduous task. While the Theater's discharge capacity was thus lower than had been anticipated, the flow of shipping from the United States had continued without a marked reduction in its scheduled rate. The result was obvious - the number of ships waiting to be unloaded rose and rose despite the Theater's best efforts to increase port capacity and to utilize existing capacity to the utmost.

81. The ship backlog which the War Department deplored was a valuable asset in the opinion of the Theater authorities. The speed of the Armies' advance had prevented an orderly accumulation of supplies in depots from which they could be hauled forward to meet the armies' needs. Too, the situation at the front brought demands for certain specific types of supplies and material which normally would have been furnished by orderly withdrawal of stocks from depots. In effect, therefore, the waiting ships were floating dumps and depots, each of which could be called up for discharge according to the changing requirements of the fighting forces. In other words, the floating reserve provided a very useful element of flexibility in supply, if not an economical one.

82. Floating depots were operated by this backlog of ships and were, in effect, the salvation of Com Z in supporting the armies as their needs

varied. While the armies were moving fast the cry was for gasoline, vehicles and rations; when the pace slowed down in the face of stiffening resistance, the need for artillery ammunition increased. The apparently idle ships off-shore were, therefore, essential substitutes for the supply dumps and depots which, under more favorable conditions, would have been on French soil. Furthermore, the full schedule of ships was needed to permit the fulfilling of the plan to send forward 50,000 tons a day to build up, in the shortest possible time, the reserves required for sustained operation by the armies and the air forces, and for support of Com Z establishments. This build-up would be possible only if sufficient supplies were immediately available in ships which could be diverted to ports expected to be opened for full-scale operations on a progressive schedule - Arromanches (A British artificial port called Mulberry "B" which was to be turned over to US), Le Havre, Rouen, and possibly Antwerp.

83. a. The ship bank as a floating depot must disappear, was the decision of the War Department. On 2 November, a cable stated "Authorized reserves over and above those which can be carried in a reasonable number of ships, gauged by your demonstrated ability to receive, must be provided for ashore"; and a cable of 6 November remarked that while the use of the ship bank for flexible storage is justified in the early stages of an operation, "the need should progressively disappear with the establishment and operation of depots ashore." These statements, reasonable enough on the surface, ignored the plain fact that the loaded ships were being effectively used as floating storage not because the Theater believed it desirable but because facilities for discharge simply were inadequate to place on shore sufficient tonnages of supplies to permit "establishment and operation of depots ashore" while pushing supplies up to the armies.

b. The War Department acted. Expressing full cognizance and appreciation of the Theater's supply problem, it demanded that the shipping backlog in the ETO be reduced materially. Obviously this was impossible to achieve quickly, lacking even then sufficient port capacity to discharge the vessels (and with the capacity of the beaches of Omaha and Utah, and the port of Arromanches, certain to be materially reduced or eliminated by weather conditions as the winter closed in).

84. a.

DAILY TARGETS AND ACTUAL DISCHARGES OF TONNAGES

IN U.S. PORTS AND BEACHES**

Port or Beach	Target	Discharged	Target	Discharged
Cherbourg	16000	7585	20000	10290
Omaha	15000	8120	10000	3895
Utah	10000	5005	4000	2210
Morlaix	-	-	3600	2345
Le Havre	-	-	1500	2190
Rouen	-	-	3000	1680
Other*	10700	5840	2000	1985
Total	51700	26550	44100	24695

b. ESTIMATED PORT CAPACITIES (LESS COAL AND BULK POL)

	Nov	Dec	Jan	Feb	Mar	Apr	May
Cherbourg	12000	11000	11000	11000	11000	11000	11000
Actual	12295	7320	7218	8695	6490	4500	1455
Morlaix	2000	2000	2000	1000			
Actual	2150	880					

	Nov	Dec	Jan	Feb	Mar	Apr	May
Arromanches & Beaches	3000						
Actual	875						
Le Havre	6000	8000	10000	10000	10000	10000	10000
Actual	4605	5370	6390	7070	4525	4005	3810
Rouen	4000	6000	6000	6000	6000	6000	6000
Actual	4525	3895	4450	5215	6380	6150	3160
Dieppe			1500	2500	2500	2500	2500
Actual							
Antwerp		15000	21500	21500	22500	22500	22500
Actual		13795	13970	16910	18025	20040	13440
(1) Marseilles	500	1500	3000	3000	3000	3000	3000
(2) Marseilles	12000	15000	17000	19000	20000	20000	20000
Actual				10755	12335	14245	11000

c. To show the effect on supply when Antwerp was opened, are these figures (daily averages) in tons:

Month	Ship Discharged*	Cleared Forward From Rear Areas*	Shipped to Armies Total	Shipped to Armies Less POL
Sept	25305 Tons	8250 Tons	11665 Tons	8105 Tons
Oct	21810	17567	11560	8105
Nov	24640	21420	11000	6925
**Dec	31260	24645	13175	9910

*Not including any POL or rolling stock.

**First month of Antwerp operation. It never reached the anticipated 25000 tons as a daily average, and not until March 1945 was 25000 tons achieved for a single day.

d. Since the beginning of operations at Antwerp, 71,835 motor vehicles loaded with cargo moved out of the port - the equivalent of a convoy 435 miles long. Nearly 80,000 rail cars filled with cargo were moved - the equivalent of a train 452 miles in length. And 1300 barges were loaded, equal to a 31 mile convoy.

a. AVERAGE DAILY DISCHARGES BY PORTS AND BEACHES (STORES ONLY)

Month	Cherbourg	Omaha	Utah	Other	Le Havre-Rouen	Marseilles Ghent	Marseilles Port de Bouc	Antwerp
Aug 44	6370	11250	6065	4350				
Sep	6345	8120	5005	5640				
Oct	9090	3895	2210	3770	3870			
Nov	12295	430	448	2150	9125			
Dec	7320			880	9265			13795
Jan 45	7210				10840	495		13970
Feb	8695				12285	2490	12720	16910
Mar	6490				10905	5535	14765	18025
Apr	4400				10155	9275	14170	20940
May	1455				6970	8330	10930	13440

f. Tonnage on the Continent 20 January 1945.

Comm Zone Depots	1,286,000 Tons
SCLOC depots	585,000
UK Depots	1,710,000
Twelfth Army Group Areas	238,000
Port Backlog	260,000
Total	4,079,000 Tons

g. Total Tonnage Shipped by ADSEC to Armies 2 Sept 44 to 30 June 45, were:

Rail	3,247,000 Tons
Truck	914,000
Air	90,000
Total	4,251,000 Tons

CHAPTER 11

OPERATION "DRAGOON"

SOUTHERN FRANCE D-DAY 15 AUGUST 1944

85. D-Day. On 15 August 1944 Operation "DRAGOON", one of the most successful amphibious landings of the war against Germany, was launched against the beaches of Southern France between Toulon and Cannes, by the United States Seventh Army with French Army "B" initially forming an integral part of the operational force. This operation had originally been scheduled as Operation "ANVIL" to be initiated prior to the Normandy Operation "OVERLORD" on 6 June 1944. The postponement of this operation until 15 August following the Normandy landings was due to the checkmate of the US Fifth Army before Cassino in Italy, and the necessity for employing available troops in the diversionary beach head operation at Anzio which were originally scheduled to participate in the invasion of Southern France.

86. Logistical Organization. The system of logistical supply and maintenance of Operation "DRAGOON" was based upon comprehensive plans devised by the Service of Supply in the Mediterranean Theater and US Seventh Army. Continental Base Section was the initial logistical force in support of this operation. Due to the unexpected lack of serious opposition and the consequent rapid advance of the United States Seventh Army up the Rhone Valley toward its eventual junction with the Northern Operation, Continental Base Section became Continental advance Section (CONAD) on 1 October 1944 and operated immediately behind the combat force. Delta Base Section became the principal logistical unit behind CONAD, closed out the original beach dumps established by the Seventh Army, and operated the port of Marseilles throughout the operation. In October 1944 an advance echelon of the Service of Supply of the Mediterranean Theater opened operations at Dijon and became the headquarters of the Southern Lines of Communications (SOLOC), subordinate to the Communications Zone of ETOUSA. Until 12 February 1945, SOLOC controlled the logistical support of the Sixth Army Group, which had early in September assumed command of the Southern Operation. Upon deactivation of SOLOC its functions were absorbed by the Communications Zone of ETOUSA and thereafter CONAD and DELTA BASE SECTION each operated directly under the Communications Zone.

87. Mounting.

a. The Seventh Army was responsible for determination of requirements for the first 60 days, and for requisitioning these requirements from SOS, MATOUSA: while SOS in turn was responsible for provision of supplies from Mediterranean and United States sources, and for delivering them to destinations specified by the Army. This of course necessitated advance planning of bulk requirements by SOS in order to build up stocks by shipments from the Z of I and to place supplies at proper points for outloading. The initial build-up was complicated by:

(1) The low priority accorded "DRAGOON" in view of preparations under way for mounting "OVERLORD".

(2) The mounting of "DRAGOON" from widely separated ports in Italy, North Africa, and Corsica which necessitated laying down supplies at bases connected only by water far in advance, when the size and composition of forces to be mounted was not definitely known.

(3) The necessity to support Fifth Army in its advance north of Rome while also mounting the Seventh Army, which had not been contemplated originally.

b. Subsequent Supply: SOS, NATOUSA was responsible for planning and providing for over-all logistical support including provision for operation of logistical support after the first 60 days of the operation.

88. Basic Logistical Structure. The planned supply structure consisted of a Base Section to be located at MARSEILLE, with a mobile advance section to follow in close support of the Armies. The great bulk of stocks were to remain in the base depots and be classified there, while advance section stocks were to be small. This decision proved of basic importance as it enabled shipment of items rather than bulk tonnage over a transportation system of limited capacity, and most major difficulties encountered later were due to violations of this principle.

89. First French Army. During the initial stages of operation "DRAGOON", French Army "B" was attached to the Seventh US Army for all operational and logistical activity. On 26 September this Army became First French Army, Seventh Army was released from responsibility for operations and logistical support and supply became the direct responsibility of CONAD and DELTA BASE, under control of SOLOC.

90. Opening the Ports.

a. Toulon. Original plans for Operations "DRAGOON" contemplated extensive use of the ports of Toulon and Marseilles, the latter including its satellite, Port de Bouc. Due to almost complete destruction of its facilities the port of Toulon was quickly abandoned as a major port and site for Continental Base Section Headquarters. However, the limited commercial-type space of the port was used to a considerable extent. The first quayside unloading in Southern France was accomplished here beginning 5 September. The harbor was quite extensively used for unloading vehicles and personnel by craft from ships at anchor. During September supplies were unloaded there in the amount of: all classes except vehicles 3450 tons; vehicles, 23,600, and approximately 19,000 tons of Civil Affairs supplies.

b. Marseilles. The port of Marseilles, which had been one of the finest on the Mediterranean, was found to be much more extensively damaged than anticipated, as the port facilities were almost totally destroyed. Original planning had provided that Marseilles would be taken on D+40. Plans were at once initiated and work started on September 2 on the repair and rehabilitation. Three Liberty Ships entered the harbor D+16 and were unloaded from anchorage. At the end of September 18 unloading berths were available. During September there were unloaded: 113,500 long tons of supplies other than vehicles, 32,800 vehicles and 10,000 barrels of POL products. 188 ships were discharged.

c. Port de Bouc. This is a satellite port, about 30 miles west of Marseilles and has for many years been the port of origin and discharge of Rhone River barge traffic. Repair and rehabilitation began simultaneously with that at Marseilles and in two weeks time dock-side discharging was begun. During September this port alone unloaded; 36,800 tons of supplies, and 331,600 barrels of POL products, from 23 ships.

91. The Tactical Plan.

a. "ANVIL" Plan becomes "DRAGOON". The first AFHQ plan for ANVIL, drawn up in December 1943, had foreseen the capture of the French port of Toulon by D + 5, with its facilities put into operation by about D + 10. Four months later, the Anzio beach head landing having intervened, the estimated time of the capture of Toulon was fixed at D + 25. The basic assumption throughout the planning was that any major exploitation northward would have to await the successful establishment of a beach head around the assault area, followed by its extension to include Toulon, and finally, with the facilities of one port available, the operation against and the taking of the port of Marseilles. The latter was expected to fall by D + 40, while it was believed that progress to the north would be just as slow. Furthermore, it was firmly believed that the Germans would probably succeed in carrying out widespread demolitions before being forced to retreat to the north.

b. Build Up Plans. The build up plans provided for about 522,000 troops and 101,000 vehicles to be landed by D + 60. About one half of the ship tonnage allotted was scheduled for Ordnance Class V items. Approximately 6,000 tons of POL were planned to arrive at the beaches during the first four days, and greatly increasing amounts in additional phases. Railway bridging and locomotives were phased in as the tactical plan indicated the need for them. Base and service troops were placed on the troop list according to the anticipated capacity of the beach depots and the ports of Toulon and Marseilles.

c. Toulon and Marseilles Captured. On the second day of the operation the first French units went ashore, and drove westward toward Toulon. Unexpectedly, both Toulon and Marseilles were reached simultaneously on D + 7 and both were finally cleared of the enemy on D + 13. Thus the operation was twenty seven days ahead of schedule and this soon had its effect on the supply situation of the advancing Armies. American task forces rapidly moved north against relatively light opposition to Montelimar and Grenoble, while the French forces moved on west to clear the rest of the coast and then north up the Rhone Valley.

d. 340 Miles in Thirty Days. By D + 16, US forces were threatening Lyon, 190 miles north of Marseilles, and the French occupied the city on D + 18. On D + 26 the French liberated Dijon and the American forces had captured Besancon. On D + 29 contact with the Third US Army was made by French Army "B" at Chatillon-sur-Seine and the Northern and Southern Operation now formed a solid line from the Swiss border to the English Channel. "DRAGOON" forces, 30 days after their D Day, were 340 miles from their beaches, in ten days less time than the original "ANVIL" Plan had anticipated the capture of Marseilles on the Mediterranean. (Appendix 9)

92. Supply over the Beaches.

a. (1) The supplies consumed in this lightning advance were nearly all brought in over the beaches. Initially stores of nearly all essential items were in good supply at the beaches but almost from the beginning a serious shortage of vehicles was felt.

(2) The manner in which ammunition had been placed aboard ship caused delay in unloading operations. In expectation of heavy fighting a layer of ammunition had been placed on top of other types of cargo. The more

immediate and urgent need for gasoline and rations, due to the unexpectedly rapid advance of the Armies, made it necessary to shift this ammunition to one side in the ships in order that higher priority items might go ashore first.

(3) Dumps were kept close to the beaches and, combined with the close-in anchorage of the supply ships, this enabled a quick turn around of the DUKWs. Nevertheless it was not until more than two weeks after the initial landing that unloading figures actually passed the target figures. On D-Day only 3,000 tons of supplies were put ashore. The supply unloading target, ~~which~~ was approximately 75% completed. Losses due to enemy action had been estimated at 15% and supplies required had been increased accordingly. Since in fact no supplies were lost the actual unloading was about 85% effective.

(4) By D + 10 the reserves built up on the beach were such that the emphasis was placed on movement of supplies inland rather than building up dumps by rapid discharge of ships. The segregation of supplies was generally satisfactory except for a back log of 30,000 tons of unclassified ammunition which had accumulated by D + 15. The beach dumps remained where they were originally placed until they were cleared by D + 40. In the period of their use the beach dumps discharged over 300,000 tons of cargo, not including 17,000 tons of bulk gasoline and more than 70,000 vehicles. The average discharge rate was therefore slightly in excess of 10,000 tons a day.

b. Organization and Operation of the Beaches.

(1) The assault units of the VI Corps, the 3rd, 36th and 45th US divisions, each operating as a sub-task force, landed on three separate beaches between Toulon and Cannes. Each division operated independently until D + 3, when the Seventh Army assumed control. Special type units and specialized personnel immediately began the process of unloading supplies from ships off-shore, transporting them across the water to the shore, over the beaches and direct to the dumps. LCIs, DUKWs, LCMs, trucks and tractors all were used at various points between the cargo ships and the dumps. 33,000 POWs and 6,200 wounded were evacuated from shore to ships on the return trips of these vehicles during the first twenty four days.

(2) Over the Beaches. Discharge over the three DRAGOON beaches started on D-Day and continued for 34 days, until 19 September when beach operations at St.Raphael were closed down. The daily rate of over-the-beach discharge averaged about 10,000 tons per day. Plans for beach operations had, on the basis of past experience, laid stress on the need for getting ships manifest papers ashore in advance of arrival, and while the procedure to accomplish this did not work perfectly, the objective was generally obtained, with resulting improvement over conditions experienced in previous beach landings in Sicily and Italy. Beach operations were under the jurisdiction of Seventh Army but personnel of Continental

Base Section formed a part of the Beach organization and eventually took over their operation. Careful combat loading and documentation of shipments proved of the greatest value. An unavoidable difficulty arose however from the fact, that since heavy opposition had been expected, large tonnages of ammunition had to be discharged which were not actually needed at the time, while POL and hard rations were desperately needed to keep the rapid advance under way. Coasters loaded only with POL and rations aided in solving this problem.

(3) Beach Control Group. In the meantime the logistical supply of the Seventh Army and French Forces came direct from the beaches where the original landings had been made. The Beach Control Group became operational on D + 2, ahead of schedule due to the rapid advance of the Army. It was instituted by Seventh Army, but was augmented by personnel from Continental Base Section who eventually assumed the entire function until the beach dumps were closed out. During the first twenty four days of the operation a total of 266,000 tons of supplies of all classes, except vehicles, and vehicles to the number of 16,500, were unloaded at the beaches and moved inshore to the dumps.

(4) Supply Build Up on the Beaches. Of vital importance to the operation was the build-up of Class I, III, and V stocks in the depots on the beaches. Scheduled to arrive, beginning on D Day were five days supply of Class I and Class III for the current total of troops being supported. An adequate reserve was to be assured at all times; expenditures in Class III actually proved heavier than anticipated, but the demand was met at all times. By D + 30 the beach depots had on hand 11,740 tons of Class I and 8,800 tons of Class III. A reserve of 10,250 tons of Class III had been built up in Marseilles and Port de Bouc. Class V planning called for the following schedule: On D-Day, five units of fire were to accompany all troops, on D + 5 there were to be five units of fire for troops landing on that day, plus 3 1/3 units of fire to maintain troops previously landed; on D + 10, five units of fire for troops landing, plus 1 2/3 units of fire for all troops previously landed. This schedule was then carried forward to D + 30, on which day a total build-up reserve of 58,500 tons of Class V was in the beach dumps. On D + 24 the beach dumps were turned over to Continental Base Section and all were successively closed out by D + 40.

93. Transportation.

a. Motor. Due to the rapid advance of the "DRAGOON" operation, during the first thirty days, the lengthening of supply lines to the combat armies became a vital factor. Early in September the US Seventh Army recalled its truck companies from their runs to and from the beach depots in order to meet its immediate needs in the forward area. The railroad daily tonnage capacity to the armies of 2,000 tons was not sufficient to meet requirements. A shortage of trucking companies to move supplies forward was partially overcome by requiring units debarking at the beaches to unload their organizational equipment, load with army

supplies and make one complete round trip to the forward area before proceeding to their final destination. A pool of civilian trucks and drivers was also utilized. By the end of September 27 truck and DUKW companies arrived and were assigned to the Base Section for operation. The Highway Division during September, handled 222,000 tons of supplies.

b. Railroads. Opening of railway lines followed as closely as possible behind the advance of the armies, but due to the rapid advance of the Armies, the military Railway Service was unable to keep pace, in their task of repairing the railroad system necessary for supply to the north. The Seventh Army Engineers did a great deal of the initial repair in order to provide one signle track line as far forward as possible. By the end of September eight full trains of supplies were moving to the Army Depots. By D + 50, rail service was open to Dijon, which became COMZ's center of supply depots. Daily capacity from Marseilles to Dijon railheads was 12,000 tons as early as 25 October which increased to 15,000 tons by the end of December. At the end of the year the rail capacity from the Dijon Railheads to Seventh US Army was 9,000 tons, and to the First French Army 7,500 tons. Supply lines to the First French Army near the Swiss border were much shorter than those to the Seventh Army, and supply by rail into that area was easily controlled and steady.

c. Air Supply of Alpine Force. The participation in the Southern France Operation of an air-borne brigade naturally involved a considerable amount of initial air-supply activity. When, however, a Link up between the air-borne and sea-borne troops was effected the major part of the supply mission of the transport planes was ended. The use by the air force of some 100 converted bombers to ferry gasoline to advance air bases reduced to some extent that service's dependence upon truck and rail facilities which were already strained.

d. Supply on a Shoe String.

(1) Nevertheless, with the combined activity of all of these transport agencies, deliveries of supplies were insufficient to meet the enormous demands of the forward units. While in the rear areas there was generally no serious shortage of supplies, in the forward areas there was throughout the period of the first three months a real and pressing scarcity of ammunition, rations and, above all, gasoline and allied POL items. In the battle of Montelimar the troops were even placed on two-thirds ration for several days while all available transportation was used to bring in higher priority gasoline for the tanks and tank destroyer battalions. Under those circumstances the build-up of stocks in the north was out of the question. On 11 September, when Dijon fell to the French Army 290 miles north of Marseilles, shipments from the beaches were two days behind on POL and one day behind on rations. Two weeks later sufficient gasoline for only one day and rations for only three and one half days were on hand in Army forward dumps. Ammunition deliveries too were insufficient although the real pinch in ammunition supply which was to develop later had not then made itself felt. A relatively low rate of consumption for most of the first month of the campaign made the amount planned fairly adequate. Here again transportation was the chief difficulty. The shortage of trucks, drivers and motor maintenance crews was now keenly felt.

(2) The progress of DRAGOON did not end by D + 30, but thereafter the resistance was stiffer and natural terrain barriers were encountered with the result that ammunition expenditures consequently became greater.

(3) Had the operation been replanned provision would undoubtedly have been made for the emergency use of more motor transport. Yet, if it is true that at the end of September the DRAGOON forces were beginning to be halted for shortages of certain items of supply, it is also true that they had succeeded, with supplies for a much more limited undertaking, in driving several hundred miles beyond their expected objective, in clearing the bulk of the enemy from southern and central France, and in gaining strategical and tactical advantages of supreme importance.

94. Supply Organization and Procedure.

a. General. Original plans for "DRAGOON" contemplated the capture of Marseilles and occupation of positions a few miles north of that port and the beaches by 25 September (D + 40), and the planned objective was limited to occupation of the RHONE Valley as far north as VICHY. Thus actual execution far outstripped the planned operation in speed and scope. In addition, logistical plans for DRAGOON were made on the basis of supporting an army of some 500,000, whereas the forces of Sixth Army Group (DRAGOON) were gradually augmented by the shift of combat troops from the north of France until the Allied military forces supported eventually numbered over 700,000. These changes, together with the fact that DRAGOON troop list did not provide an adequate number of service troops, created a very difficult supply situation which was to continue throughout the operation. From beginning to end "DRAGOON" was a fast moving "shoe string" operation.

b. Organization of the Logistical Base. There were many features of the landing operations, logistical management and the opening of the Mediterranean Ports which were quite different than those in Normandy, but such details are omitted from this report inasmuch as they are covered in a comprehensive manner elsewhere. One great advantage of the Marseilles Area as a permanent depot is that the neighborhood outside of the city is replete with large areas of open hard standings and there was much available covered storage space. Another important feature was that there had been relatively little damage due to combat action and local railroad service was in operation at a very early date.

c. Supply Levels. Supply planning and action continued by SOS, NATOUSA, with a view of supporting the DRAGOON force plus four additional divisions (3 US and 1 French) than contemplated, and building up a 45 day level of supply in Southern France by 1 December with increase to the authorized theater levels as rapidly as possible thereafter. It was not possible to achieve this rate of build-up, however, due to the larger support responsibilities that were incurred.

d. Initial Base Sections. A base section designated originally as Continental Base Section was created in Italy on 7 July 1944 and began its organization and planning. After its participation in the beach operations, and the occupation of MARSEILLES on 27 August, base section headquarters were established at that port. Base Section operations were first centered on opening the port, which was accomplished by 16 September; in selecting depot sites, starting

repair of rail facilities, and in getting POL tankage and pipe lines in operation. Actual supply was largely by Seventh Army until about the end of September when service troops ear-marked for the line of the Communications were re-assigned to the base section.

e. Advance Section. As the advance of the Armies continued, Continental Base Section was redesignated Continental Advance Section (CONAD) and sent forward in support of the armies, with headquarters at DIJON. A new section which had been organized took over operations at Marseilles, which was designated Delta Base Section. Requisitions of the Armies (Seventh US and First French) were received by the Advance Section which called forward supplies as required. No Regulating Station was provided for in the CONAD set-up and the functions of a regulating station were performed jointly by CONAD and the armies. Integrated with CONAD units was the FRENCH POL Base which materially assisted CONAD in its supply of the First French Army, particularly those items which were indigenous to North African French territory and to Continental France.

f. SOLOC. As advance echelon of Headquarters, SOS, NATOUSA, was established in Southern France in September 1944, which became Headquarters, Southern Line of Communications (SOLOC), when the operation came under jurisdiction of the European Theater of Operations in November 1944.

g. Delta Base Section.

(1) This Base Section contained practically all its original geographical area throughout the operation to the end. It was organized on 1 October 1944, with headquarters in Marseilles and comprised the area of Southern France from the Mediterranean as far north as a line from the Swiss border, westward along a line between Lyon and Macon, thence westward along the Loire River to the Bay of Biscay. An area along the Bay of Biscay which included St. Nazaire and Bordeaux was held by the enemy long after the rest of France had been liberated, until absorbed and occupied by small French forces. The Spanish border on the southwest and the Italian border on the east completed its boundaries. It was the largest base section in geographical area, but much of it never was actively involved in any Base Section activity.

(2) Most of Delta Base activities were centered around the Mediterranean ports and up the Rhone Valley to include Lyon, and eventually included a comprehensive leave area on the Riviera. Marseilles ultimately became the second largest port available in Europe, and handled much of the initial staging area and redeployment activity prior to the surrender of Japan. Otherwise the mission of Delta Base was that normal to any base section which contained a large port. Several American combat divisions entered France by way of Marseilles in January, 1945, and the Base Section established a motor vehicle assembly plant in the dock area at Marseilles where the equipment of these divisions was put into condition for movement to combat area. Vehicles were assembled at an average rate of 450 per day. Marseilles also handled considerable evacuation of German prisoners of war to the US, and many displaced

persons to their native countries bordering the Mediterranean. One of the largest depot areas in Europe was established at Mirimas, about 30 miles northwest of Marseilles on the Bay of Berre, for Ordnance, Signal, Quartermaster and POL storage. There was also a very large French ammunition depot in the vicinity. Mirimas had been a large American Depot in the First World War and many of its original constructed facilities were thus used for the second time.

(3) The majority of the personnel and service units which operated Delta Base Section had already had, like those of COMZ and SOLOC, considerable experience in the North African and Mediterranean Theaters. It absorbed personnel from Continental Base Section and SOLOC. On 1 October 1944 it took over the partially organized base section from Continental Base Section which then went forward as COMZ. Elements of French Base 901 and many Italian co-belligerent service units became important factors in attaining its mission. The Headquarters and units of the Sixth Port rehabilitated the Mediterranean ports, having a background of experience in Oran, Naples and other ports in the Mediterranean area.

(4) When the combat area had passed far to the north of France, and service units were badly needed to perform its function, Delta Base was authorized to convert a number of combat units into service units of various types, especially as truck companies and security troops, thus alleviating a most serious deficiency.

(5) The following tabulation shows the activities of Delta Base Section shortly after it assumed its initial mission.

AVERAGE DAILY DISCHARGE OF SHIPS:

	Oct.	Nov.
Marseilles	13,000 tons	16,250 tons
Port de Bouc	1,665 tons	2,120 tons
	14,665 tons	18,370 tons

AVERAGE DAILY TONNAGE HAULED:

	Oct.	Nov.
By Rail	9,750 tons	10,675 tons
By Highway	17,475 tons	21,475 tons
	27,225 tons	32,150 tons

SHIP BERTHS AVAILABLE 30 NOVEMBER 1945.

Liberty	43
Coasters	5
½ Liberty	5
Other	14
Total	67

h. Establishment of Depots. During the first twenty four days of "DRAGOON" supply to the armies was almost entirely from beach dumps. From the speed with which the operation moved northward it was evident at an early date that the Marseilles area would be too far distant for direct supply. Nevertheless reconnaissance was made for depots of all services; these were quickly put into operation upon receipt of stocks, turned over to Delta Base Section

when Continental Base Section became the Continental Advance Section (CONAD) on 1 Oct 1944. Marseilles eventually became the second largest port in ETOUSA.

i. Labor Units. Italian service units which had been organized and utilized in North Africa, landed on D + 2 and performed much of the labor in the beach dumps. By the end of September 20,000 had arrived and by 31 October this figure had reached 38,000. Many of these units moved forward with CONAD, 88 companies, 625 officers, 12,100 men, while the balance remained in Delta Base Section. These units had been organized in North Africa, while prisoners of war, and those who volunteered for further military service became co-belligerents. The service companies had their own Italian officers, and each company had a small cadre of American Army supervisory personnel. Their use had been so beneficial in North Africa, where they were assigned to and worked under the various services, that they were brought into France and operated as non-combatant service troops. Without them CONAD and Delta Base Section would have been sorely pressed for both skilled and unskilled labor.

95. Miscellaneous Supply Procedures.

a. POL. In the initial stages of supply of Class III, a Petroleum, Oil and Lubricants section was organized, independent of the Quartermaster Corps. Under its control were all QM gas supply companies, QM service companies for labor, and the Engineer pipeline companies. This arrangement was deemed worthy of experiment due to the large amount of POL products expected to be handled and stored, the operation of bulk installations, refueling points, refilling installations, and the construction and maintenance of the pipe line. This section continued to function until February 1945, when it was assigned under control of the Quartermaster Corps by directive of Com Z ETOUSA.

b. Supply of French Troops. The "DRAGOON" troop list originally included 238,000 French troops and their supply was the responsibility of French Base 901 which was closely integrated with and parallel to the American base sections. Equipment, uniforms and rations for most of these French troops came from American and British stocks, with certain items of the ration, peculiar to their religious and other national characteristics, being procured from indegenous sources.

c. Supply and Maintenance.

(1) Requisition. Shipments to the Armies were made on the basis of requisitions submitted by them to CONAD. In many cases shipments from Delta Base were routed directly through to the Armies without going into stocks of the Advance Section. Urgent Army needs and delay in building up stocks in the advance section made this necessary. As advance section depot stocks were built up this procedure was gradually eliminated. In the early stages of the advance shipments of some bulk tonnages reached the Armies which were not required by them at the time. This overloaded Army Supply dumps, and was a waste of transportation and use of Service Troops involved in handling, and is an example of departure from the principle of shipment of items from Base Depots.

(2) Tonnage. The capacity of the rail line up the Rhone Valley was allocated to requirements of the various users on the basis of tonnage bids submitted to Headquarters, SOLOC.

(3) Shortages. All requirements of the Sixth Army Group were met, with the exception of shortages which prevailed throughout the entire Theater and in the Z of I. Stocks in Army Depots were maintained at or above authorized levels except during mid-January when bad weather conditions seriously delayed rail transportation and Army stocks reached a dangerously low level for a short time. Emergency action in the use of motor transport restored the situation by 1 February.

d. Mission of CONAD. On 6 Oct 1944, Comm Z, NATOUSA, announced the six specific responsibilities of CONAD, as follows:

"(1) Close support of the Seventh Army, French First Army and other forces under the command of Sixth Army Group, and such other forces located forward of the rear boundary of the Advance Section as may be assigned for supply.

(2) Maintenance of prescribed levels of supply and the establishment of mobile advance depots adequate for this purpose.

(3) Local procurement of supplies and the necessary coordination with civilian agencies.

(4) The establishment of fifth echelon maintenance facilities for the full support of the combat forces, evacuation of unserviceable material and salvage from combat zone installations, and the movement to Delta Base Section of that material which cannot be repaired in the Theater.

(5) Evacuation of casualties from the combat zone installations and establishment of hospital installations necessary to receive them.

(6) The delivery of supplies as they are called forward by the major commands supported by the Advance Section; the coordination of, and planning for, all means of transportation between the Advance Section and the Combat Zone and the operation of such units as may be assigned."

Other responsibilities delegated to CONAD included operation of Depots and maintenance installations of a mobile character; requisitioning on Delta Base Section in order to maintain supply levels as prescribed; and all normal administrative functions.

e. Levels of Supply. The levels of supply were fixed at not to exceed 15 days of supplies of all classes in the Armies, not to exceed 30 days of supplies of all classes in CONAD, including those held by the Armies. Armies were directed to keep their supply levels at a minimum, even though 15 days was authorized. Delta Base Section was directed to hold in its Base Depots the Theater level of supply which varied between 60 and 75 days for the several classes.

96. Static Build-Up Period.

a. On 1 October Continental Advance Section (COMZ) established its headquarters in DIJON, with Service depots located all the way from Chalon-sur-Saone northeast to the Moselle River. Ordnance Depots of various classes were located in Langres, Chaumont, Dole, Gray and Beaune. The principal Quartermaster Railheads were initially in DIJON, eventually displacing forward to Epinal, Vesoul, Besancon, and Luneville. Base and Station Hospitals were widely scattered throughout the forward part of the COMZ area where they could best perform their missions. An Engineer General Depot was located in DIJON and Chemical Warfare and Signal Depots and installations were scattered throughout the COMZ area, wherever facilities were available. Some depots were taken over from the Seventh and First Armies and continued to be operated in a similar role.

b. COMZ policy was, right from the beginning, to keep all maintenance installations as far forward as possible, in order to reduce the distance to the Armies' rear boundaries. This was advantageous both for supply and maintenance to the front, and for evacuation and salvage to the rear. The controlling factors, in the COMZ area, were the absence of large city installations and the retention by Seventh and French Armies of many spacious installations behind the Army boundaries.

c. Delta Base continued, throughout the first five months of the operation, to maintain large depots of classified stocks, and as the railway transport system improved, with a resultant increase in tonnage moved forward, this enabled the supply of the armies to reach a fairly normal procedure.

d. From Lyon each Army was supplied by rail direct over its own independent axis of communication, which greatly relieved the congestion in the Dijon rail net. Much difficulty was experienced in adapting the French "Chef de Gare" system of train traffic control to the American system. During the first two months shortage of personnel for control of rail traffic over the French system was the cause of congestion and faulty documentation of shipments arriving in the forward area, but by November first the establishment of Rail Transportation Offices at all cirtical points had produced steady and permanent improvement. The installation of efficient mechanical communications contributed greatly to this progress.

e. In November the Seventh US Army drove through the Saverne Gap and Strassbourg was captured on 24 November. The French Army, at the same time drove through the Belfort Gap, captured that city on 21 November, and on to Mulhouse which fell the next day. These two operations placed elements of the Sixth Army Group on the Rhine River, the first Allied force to reach that famous barrier. These advances also extended the supply requirements for the Armies themselves, but caution dictated that their own supply installations be not too far forward because of the bottle neck of limited highway facilities through the Vosges Mountains onto the plains of Alsace, the Saar River Basin and the Rhine Valley.

97. Drive through Vosges Mountains.

a. COMZ Headquarters remained in Dijon until 17 February 1945 while the Armies were making slow but steady progress through the Vosges Mountains into Alsace, Lorraine, and the Rhine Valley. The spectacular dash of the Armies of the Sixth Army Group had been gradually slowed down, due to severe weather condition, natural terrain barriers, increased hostile resistance and by the threats of enemy counter-offensive action.

b. The Seventh Army retained many of its major supply depots and installations well behind the forward combat areas and this in turn prevented COMZ from moving further forward at an earlier date.

c. In January COMZ's organic depots were finally able to reach their prescribed levels of supply for the first time since the operation began in the previous August. Shortage of transportation had again been the reason, inasmuch as everything that moved on wheels until the end of the year had been urgently required to supply the Armies direct, with a limited list of "live items" only being placed in the COMZ Depots.

d. One of the great installations in the Sixth Army Group area which was never utilized to anywhere near its full capacity was the marshalling yards at Is-sur-Tille, about 15 miles north of Dijon. This yard had been built in 1917-18 specifically to serve the railroad system which supplied the American zone on the Western Front in World War I from the Atlantic ports of St. Nazaire and Bordeaux. It was used successively in World War II as a COMZ storage yard, a redistribution station and as a Class III POL and Class V ammunition Depot.

e. On February 10 the former headquarters of Brittany Base Section took over control of the rearmost portion of the COMZ area as Burgundy District and COMZ headquarters moved forward to Nancy in order to be in a more favorable position to support the early spring offensive against the Siegfried Line and the Upper Rhine barrier. Burgundy District thus became, in effect, a relatively small intermediate base section between Delta Base and COMZ, and functioned as such until it was incorporated into Oise Intermediate Base Section on 21 March 1945. Burgundy took over many of the permanent type installations and depots which had originally been established by COMZ.

98. Conclusions:

a. This brief summary of the logistical plans and procedures in the initial support stages of operation "DRAGOON" is entered here at the close of the period just prior to the time when the Sixth Army Group operation from Southern France became wholly integrated with the Northern Operation - from the logistical point of view. Due to many peculiarities of this operation, supply mechanics and procedures had been developed along lines differing from those used in Comm Zone, ETOUSA. The success of SOLOC, COMZ and Delta Base Section in supplying Sixth Army Group, appears to have resulted from the following factors:

(1) Adequate advance supply planning and operational action.

(2) Previous experience of Line of Communications units and personnel gained in support of operations in Tunisia, Sicily and Italy.

(3) A sound supply structure founded on the idea of certain base depots closely backing up the port and others distributed in depth from the Army areas back to the port; thus permitting classification and preparation of stock records and resulting in shipment of items rather than bulk tonnage.

(4) Close cooperation between Army and Comm Z supply agencies.

b. From February 1945 to V-E Day supply procedures were almost wholly under the Comm Z system, except such minor details which the Sixth Army Group logistical echelons had inherited from the SOS of the Mediterranean Theater and which were gradually being modified accordingly as rapidly as possible to coincide with Comm Z over-all directives.

99. a. After COMAD's arrival in Nancy on 17 February 1945, it retained operational control of all of the depots which it had established in October and November 1944 until Burgundy District became absorbed by Oise Intermediate Section on 21 March 45, and in addition began the planning of a large general depot area in the Nancy-Metz-Toul-Commercy area where was rapidly accumulated 289,360 tons of supplies and equipment in preparation for the spring offensive. It was to be composed of the following tonnages:

QM Class I	43,000 tons
QM Class II and IV	24,000
QM Class III Coal	18,360
QM Class III POL	55,000
Ordnance Class II and IV	24,000
Ordnance Class V	100,000
CWS Class II, IV and V	4,000
Transportation Class II and IV	1,000
Signal Class II and IV	20,000
Total	289,360 tons

This huge depot was absorbed by Oise Intermediate Base Section and continued the build-up. Much of the stock was brought in from Antwerp (See Exhibit "I").

b. Stupendous amounts of supplies were, three months after Antwerp was opened on 28 November, '44, coming into the forward area depots from both the Northern and Southern ports as well as from the rear, and flexibility in the assignment of arriving stocks was now achieved by Comm Z for the first time since the two operations were initiated.

c. During the months of February and March COMAD furnished 446,200 tons of supplies to the US Seventh and French First Armies in preparation for and support of their forthcoming drives into Germany. This movement was accomplished by the "Green Diamond Operation" similar to the "Red Ball Highway Express", over 450 miles of main and branch highways.

100. Spring Offensive to V-E Day.

a. On 10 March the general supply situation in the Sixth Army Group zone of action was greatly improved, in preparation for the final drive through the Saar to the Rhine. US Seventh Army had on hand 7 days supply of gasoline, 11 days supply of rations and 54,000 tons of ammunition. The supply status of the French First Army in Alsace was likewise equally satisfactory.

b. On 15 March the US Seventh Army opened its offensive against the Saar Basin and continued rapidly to the Rhine, while the French First Army, having previously secured all of Alsace on the Rhine above the Hagenau Forest, had made an accompanying drive to the

Rhine north of Hagenau during the last week of March. Both armies crossed the Rhine during the last week in March and continued their rapid drive toward the southeast, through Baden, Wurtemberg and into Bavaria.

c. Because of the intensive bombing by Allied aircraft all rail facilities in Germany west of the Rhine were very badly damaged and it was estimated that the supply of the Armies by rail could not begin until at least six weeks after the Seventh Army passed through the Siegfried Line and advanced toward the Rhine. Therefore, the "Yellow Diamond Operation", an extensive trucking plan similar to the "Red Ball Highway Express" in northwestern France in the summer of 1944, was organized and continued to operate between the Nancy-Toul-Metz-Luneville depots and the Army forward area until long after the Rhine crossing. At its peak of operations "Yellow Diamond" had 1825 task vehicles of various types. During March trucking organizations of COMZ covered a total of 1,039,500 miles and transported 177,000 tons of supplies, most of which was by the "Yellow Diamond".

d. On 1 April three heavy pontoon highway bridges were in operation across the Rhine in the Seventh Army Zone and on 23 April a railroad bridge was completed in Mannheim. In the French First Army zone bridges were laid across the Rhine and a railroad bridge was in operation early in May. Repair of intermediate bridges and highways by the Army and COMZ Engineers allowed wholesale truck supply to the Armies to continue uninterrupted. The tactical operations of the Armies was so fluid, east of the Rhine, that frequently the forward control detachments of "Yellow Diamond" were moving along with forward elements of the Army. During this long period of rapid movement the expenditures in POL products were enormous and during the first week in April Sixth Army Group units burned up a daily average of more than one and one-half million gallons. Priority had to be given to Class I, III, and V, in order to maintain success of the drive, nevertheless Class II and IV did not develop any critical shortages. "Yellow Diamond" delivered to the US Seventh alone an over-all daily average of 3,300 tons of supplies and total ton-miles amounted to the stupendous figure of 25,470,000 for a daily average of 359,000. On one day a record haul of 6,850 tons was attained. This trucking project covered main and subsidiary routes from Nancy, on the Moselle-et-Meurthe in Lorraine to Munich, Germany, fifty miles beyond the Danube River, more than 325 miles.

e. Upon entry into Germany in the middle of March volumes of enemy material were captured by the Sixth Army Group Forces and much of this was turned over to COMZ and Military Government. The subject of captured enemy material is discussed briefly in Chapter XVII of this report.

101. Statistical Data.

a. Truck Haul. Between 2 Oct 44 and 15 May 45 COMZ Transportation Section alone hauled 561,500 tons of local deliveries of cargo, and 295,000 tons of long haul cargo.

b. Rail Haul. In the same period COMZ Transportation alone received 124,500 freight car loads, or a weekly average of 4,780 carloads for twenty-six weeks, and forwarded to the Armies a total of 123,500 carloads, or a weekly average of 4,115 for thirty weeks.

102. Conclusions on the initial "DRAGOON" operation have been incorporated in the general text in this chapter. Following the junction of the Sixth Army Group and the Twelfth Army Group, which process began 14 Sept 44, when the French First Army contacted the Third Army near Chatillon-sur-Seine, and developed into one solid front by 10 November, 1944, the logistical phases coincided quite closely with those which are described in detail in paragraph 9, Chapter V of this report. Comm Z absorbed SOLOC completely in February, 1945, although the process had been in the development stages since November, 1944, when logistical phases and conditions became more or less coincident with those of the Northern Operation.

CHAPTER 12

THE SUPPLY SYSTEM IN THE ETO

103. a. Three levels of supply, minimum, operating, and maximum were established for the European Theater by War Department directive.

b. The minimum level represented the emergency reserve of stocks prescribed by the War Department as necessary to provide for the replacement of the normal routine supply in case of delays in transportation, enemy action or other unforeseen contingencies. Minimum levels were based on War Department replacement factors for all items having such factors. The basis for computing quantities requisitioned was the equipment authorized by T/O and T/E or special lists of equipment for units projected to be in the Theater when the supplies arrived. Special projects approved by the War Department did not come within this category since they were complete projects with no requirements for maintenance of depot stocks. The sum of all authorized items was multiplied by the monthly replacement factor and by the number of months prescribed as requiring the minimum supply level.

c. The operating level which was predicated on the frequency of sailings, covered the number of days of supply necessary to maintain the Theater until the arrival of successive scheduled shipments. It was computed for the time interval authorized by the War Department, and on the same basis as the minimum level.

d. The maximum level, which was the sum of the minimum and operating levels, constituted the total quantity authorized as on hand in the Theater at any one time.

104. a. The theater levels were prescribed as follows:

Class	Maximum	Minimum
I & III	60 days	30 days
II, IV & V	75 days	45 days

b. Quantities of supplies were computed on the theory that a day of maintenance for any particular period, was equal to a day of reserve during the same day.

105. Flexibility Mandatory.

a. The Normandy landing reaffirmed that which was already known. No matter how carefully plans are laid, battle conditions will in various respects vary from those anticipated. Tactical commands will call for different supplies in quantities or at times which are different from those originally scheduled. Flexibility in supply operations is mandatory, but can only be obtained if documentation of ships and cargoes is completed and furnished to share supply authorities in time to be of use. Future planners should provide not only a system which will achieve control but must make provision to enforce measures leading to establishment of that control.

b. There is a lesson re-emphasized in the Normandy experience. Supply forces have as much interest as tactical troops in making sure that the spearheading force in a landing penetrate to the maximum depth not only to give maneuver room to combat troops but to provide space needed for the efficient operation of supply troops in

order to support the later advances.

c. One of the greatest factors to bring about efficient supply and maintenance is a fast-moving supply situation, such as developed after the breakthrough at St. Lo, is daily conferences of all the various supply branches with their corresponding representative of G-4 and stating "We have this" and "We need that." Allocation of tonnages by rail, truck and water lifts can be made daily and conforming to the actual lift possibly by the then known facilities. It must be borne in mind that demands should be kept at a minimum, allowing any excess in tonnage for the period to flow to established depots forward for their build-up and emergency supply, until depots are established and balanced stocks are on hand, so that requisitioning procedure may be set up.

106. Deficiencies in the Supply System.

a. There were many factors which complicated the prompt establishment and operation of a well regulated supply system on the Continent. First among the factors accounting for this situation was the delay encountered in securing adequate port facilities. Cherbourg was not finally opened for Allied operations until 16 July 1944, in contrast to the planned opening date of D + 11 (17 June 1944). The badly damaged condition of the port of Brest rendered it useless as a base for operations. Le Havre was not opened until November and Antwerp not until 28 November 1944. Added to this was the fact that the rail net west of Paris was inadequate to haul the enormous tonnages required for the armies, and the lack of inland water transport facilities in that area prevented any relief that might otherwise have been available from that source.

b. These factors - combined with a growing optimism for an early termination of the war in Europe - had slowed down efforts to establish a system of depots in depth and the proper build-up of authorized stock levels in forward installations. The rapid advance of the armies to the east after the breakthrough, 26 - 29 July 1944, forced the adoption of emergency measures of rush supplies to forward areas to relieve this situation.

c. Estimates relative to the amount of tonnage the Transportation Corps could handle often proved to be excessive. The tonnage capacity of rail wagons or trucks was accepted frequently without allowing for the fact that the size of some items prevented loading those vehicles to their actual tonnage capacity. Consequently, G-4, Com Z was forced to the conclusion that most estimates were over optimistic.

d. However, there were other factors which impeded attempts to create a smooth flowing supply pipeline. These resulted largely from the failure to effect a general application of all the provisions of SOP's and other regulations relative to the requisitioning and movement of supplies. It is impossible to trace the effects of the contributing factors through all the supply echelons - nor would it contribute materially to the story. Consequently, this discussion is confined to a selected number of incidents which are representative of the problems encountered by G-4, Com Z.

(1) Consolidated Critique.

(a) One of the principal hardships to efficient depot operations was the lack of sufficient service troops, this being further aggravated by the fact that service personnel were sometimes employed as POW guards by necessity.

There was also evidence which indicated that some depots actually were not on a 24-hour basis for the discharge of incoming shipments whenever required.

(b) No uniform procedure relative to documentation had been established. The general consensus of opinion was that properly prepared tally-out and way bills for rail and truck convoys would eliminate many errors in shipment and also facilitate deliveries.

(c) Many truck shipments had not been received due to lack of control enroute. Investigation disclosed that there was no means available to make a thorough check of trucks which departed from Normandy Base Section at Transportation Control Points (TCP's) along the known route of convoys.

(d) There was no uniform system which advised the Armies in advance of unavailable items, or those back ordered, cancelled, or even those actually shipped.

(e) The use of civilians in train crews proved detrimental to the control of train traffic.

(f) Careless loading at truck-to-rail transfer points resulted in the loss of much time and tonnage, while supplies of the same service and class were not loaded on the same truck convoy or train.

(g) There as inadequate communication between Com Z and Normandy Base Section and between sections and their depots.

107. Status of Supply Procedures (1 December).

a. Changes. Supply procedure at this time was as follows; by the end of November the Class I system had been changed. Shipment of balanced rations from rear area direct to Army dumps against daily telegrams had been abandoned in favor of bulk shipments from ports to advance Com Z depots for issue to the armies. During December the shipment of POL direct from the rear area and from pipe-heads on the Seine River to the armies was stopped, and shipments were made to advance Com Z dumps with subsequent supply from these points to armies. Since late October ammunition had been shipped in bulk for sorting and classification to advance and intermediate depots, thence allocated by Twelfth Army Group to the armies, which drew on credits set up at the depots within such allocations. During December Class II and IV was changed from a daily telegram to a ten day requisitioning basis. Available classified stocks were concentrated largely in Normandy, and trains largely moved direct to the armies from that area. This system was to exist until the Port of Antwerp really got into full operation, after which supply from the forward depots would become effective. It was estimated that this change over would take place by 15 January. (Appendix 16).

108. South End High Discharge Rate. Incidentally, the discharge rate in SOLOC (see Chapter II "DRAGOON" Southern Operation) reached far higher daily averages than that of northern France at the turn of

the year. This was to be expected so far as Le Havre and Cherbourg were concerned, since neither of these ports had been built to handle cargo on a grand scale, and both had suffered from military action. It was hardly to be expected of Antwerp, however, where discharge facilities were ample and modern, and where skilled civilian labor provided the manpower. Harassing by enemy V weapons had of course, some effect on discharge results, but the fact remained that Antwerp was averaging approximately 525 tons per ship per day discharge, while Marseilles, hardly its equal in operational facilities in peace time, was making much better unloading records. The comparison between the two ports is the more surprising because Antwerp was taken practically intact while the Germans had very thoroughly demolished Marseilles. Not one of its 121 quay side discharge areas was serviceable at the time of its capture and 125 cranes had been wrecked.

109. Marseilles Discharge Program. Marseilles did a bang-up job in ship discharge, its average daily tonnage per ship during the winter exceeding that for the northern French ports. The reason was that Marseilles had a driving discharge program. Work was on a 24-hour schedule and there was no stoppage at meal hours, or between shifts - two full shifts and one swing shift, the night work going on under lights. Trucks operated on the same schedule, so that there was no pile up of cargo on the quays. There was no sorting in the holds of ships; all sorting was done in the dumps inshore. Too, all discharge was at quay side, whereas Cherbourg and Le Havre used lighterage to some extent. The general Marseilles policy was do anything and everything that gets ships turned around, and let other problems get solved as best they could.

110. Northern Ships Diverted to Marseilles. However, when G-4, Com Z sought to relieve the pressure on the northern ports by having SOLOC accept general cargo for discharge at Marseilles (10 to 15 ships, mostly Engineer Class II and IV), SOLOC stated its inability to handle more than its own scheduled intake plus the 21 ships loaded with vehicles and filler cargo with already had been ordered diverted from Northern Ports. Unless, it was added, Com Z furnished truck companies, locomotives, and rolling stock to handle the additional intake--and if supplies were to be stored in SOLOC, Com Z must also furnish additional depot troops. Further, since experience had shown that it took at least 30 days to obtain troops and material from Northern France, general cargo could not be handled until March, at the very earliest. Some additional facilities were furnished, and on 3 February two convoys of vessels scheduled for February sailing were ordered diverted to Marseilles.

111. Theater Reduces Shipping Voluntarily. At the same time that the above diversions were directed the pressure on northern ports was further relieved by the Theater cutting 30 ships from 243 commodity loaders scheduled for March arrivals -- with the proviso, however, that request for reinstatement might be made later. Enough tonnages now were coming off the ships to supply the armies adequately and, in fact, supplies were piling up in Antwerp above the 120,000 ton mark. This pile up resulted from enemy action having interfered with the plans for increasing the forward area reception capacity. The day before the opening of the German drive through the Ardennes (16 December) the port discharged 19,000 tons, and had an accumulation of 73,000 tons awaiting clearance. Thereafter, discharges were curtailed, but accumulated tonnage continued to mount since sufficient facilities to receive it remained lacking in the forward area.

112. Northern and Southern Shipping Consolidated: Shipping for the Southern Line of Communication (SOLOC) became included in ETOUSA's requirements as the result of decisions reached early in December, with

the effect of this consolidation of requirements to be felt about 1 January 1945. Here it is pertinent to say that although Marseilles, the principal SOLOC port, was large, efficiently operated, and capable of receiving a great deal more tonnage than was required to support forces in Southern France, it could not be used to full capacity to help support Northern operations if, at any time for tactical or other reasons, port facilities in Northern France became inadequate. The bottleneck was railroads. The rail capacity of north and south lines in the Rhone Valley simply was incapable of handling any great amount of tonnage above SOLOC's needs for the Sixth Army Group (See Chapter 11).

113. Closing down the Beaches. Discharges for August had amounted to 28,040 tons. The decline in unloadings that continued through October represented chiefly the falling off in intake at the beaches and the discontinuance of operations at the smaller ports (except Morlaix, which continued operations through 14 December). This loss of intake capacity was offset only partially by the opening up of Le Havre and Rouen, the former on the 11th and the latter on the 16th of October; and by the stopping up of the tonnages coming in through Cherbourg. In November both Omaha and Utah beaches closed down, but the Le Havre-Rouen combination kept a steady pace through April, 1945, with a maximum daily discharge of 12,285 tons in February; while Cherbourg declined steadily as a stores port although it had, like Le Havre-Rouen, a February renaissance which gave it 8,700 tons daily average for the month.

114. Antwerp, Ghent, Marseilles the Big Producers.

a. First Antwerp, in the last three days of November, then Ghent on 24 January and finally Marseilles-de Bouc in February, became the big tonnage producers. The latter port up to this time had not been included in 3-4's data on Continental intake, as it handled mainly supplies for the Southern armies, exceptions being certain vessels sent there to relieve the congestion at Northern ports.

b. In February, opening of a second double-tracked railroad line North from Marseilles along the Rhone enhanced materially the ability of that port to clear supplies forward.

115. Average Daily Discharges and Clearance to Forward Areas.

Month	Tons landed on Continent	Tons Cleared to Forward Areas#
August	28,040	
September	25,305	12,000**
October	21,810	28,115***
November	24,640	22,165
December	31,260	24,295***
January 1945	32,515	26,160***
February	53,100	35,695
March	55,830	48,485
April	52,580	41,620
May	41,195	26,925

* Rail and Truck only
** These and later figures include air
*** These and later figures include barge

This is not port clearance. For Normandy Base Section it includes only tonnages sent forward of the Section; for Channel Base Section it includes supplies sent beyond the Section and also supplies sent to depots other than base depots, plus a small percentage of port receipts (about 10%) sent forward from Marseilles without touching the base depots. The difference between the two columns, therefore, represents rear area stock build-up plus local consumption

116. Planned Maintenance Scales.

a. In pursuing the winter offensive and preparing for the final spring offensive, maintenance planning was based upon requirements for the following combat divisions and separate regiments:

	Twelfth Army Group	Sixth Army Group
1 Dec 1944	30 Divisions + 6 Regts	16 (incl 8 French) divisions
1 Jan 1945	34 Divisions + 9 Regts	16 (incl 8 French) divisions
1 Feb	41 Divisions	19 (incl 8 French) divisions plus 9 Regts.
1 Mar	44 Divisions	19 (incl 8 French) divisions

b. The maintenance scale was set at 750 tons per division per day during December and January, and 675 tons during February and March, Reserves for 28 days should be imported for each fresh US division during the 30 day period after its staging until 1 December. Thereafter, the remainder of US Theater reserves (approximately 700,000 tons) were to be built up by 1 March.

c. The daily estimated maximum tonnage requirements, less coal and bulk POL, were:

	12th AG	6th AG	Total
Dec 44	22,900	13,400	36,300
Jan 45	31,400	14,100	45,500
Feb	43,100	14,300	57,400
Mar	47,800	13,400	61,200
Apr	35,900	13,600	49,500
May	36,100	13,500	49,600

117. Notes on Quartermaster Supplies.

a. (1) At several different periods during the course of operations additional Headquarters, such as Base Sections, Groups, Councils, etc., were established without sufficient notification to order supplies for that purpose. Each Headquarters required substantial quantities of office equipment and supplies.

(2) The delivery of troops to this theater was accelerated at various times over and above the rate at which supplies were ordered.

(3) Commissioned officer personnel frequently arrived in this theater demanding complete uniforms. It was necessary to publish orders and issue clothing ration cards to control the volume of sales. A level was necessary to meet these commitments since stocks had been ordered on a replacement basis only.

(4) Assault troops did not carry overcoats or other winter items across the beaches.

b. Planning for equipping troops for winter combat eventually became a major problem. Since the individual could not carry a wardrobe with him during the early phases of the operation and during the breakthrough, the amount of clothing that could be carried was very limited. Overcoat, overshoes and other winter items were left behind. Plans provided the troops with two sets of woolen underwear, two pairs

of woolen trousers, two woolen shirts, an overcoat or mackinaw, a wool cap, six pairs of woolen socks, a sleeping bag, two blankets, gloves, boots and overshoes. Special extreme cold climate clothing, such as shoepacs, ski socks, mufflers, and other items, for 450,000 individuals was procured. Beginning on 10 October 1944, from the mud of Normandy and through the air from England, 6,500 tons of blankets, overshoes, and other winter equipment were shipped to the armies. Initially, 41% was moved by air. By 15 January 1945, special winter equipment had been made available to every foxhole combat soldier in the European Theater.

c. (1) It was the responsibility of the QM to effect an equitable distribution of supplies to newly arriving troops in the rear area, this problem being enhanced by the large number of controlled QM items which required special attention, and it was further augmented by units and personnel which arrived on the Continent from both the US and the UK not fully equipped.

(2) The Base Depot operations were handicapped by excess mud, and many innovations were employed, primarily mud sleds, tractors and bull-dozers being used to pull loaded trucks. Mud traps were used at the exits of all fields.

(3) Items controlled by COQM because of short supply were:

Regular Supplies

Blank Forms
Heaters, water immersion
Office Machines,-Typewriters
Ranges, Field A & B

Class II - Clothing

Mufflers, Wool
Jacket, Field, Wool
Overcoats, Parka Type Reversible
Pouch's
Shoe Pacs and insoles
Socks, ski or arctic
Trousers, field, wool
Trousers, field, cotton

Class III-White Peter (White gasoline)

Class IV - Medals, decorations and awards; Officers, Nurses and WAC Officers Clothing. Canvas, Duck

Equipage

Headnet, Mosquito
Bag, sleeping, mountain
Bars, Mosquito
Liners, cotton for bag, sleeping
Gloves, Mosquito
Montage and Paulins

(4) On ships which carried preponderantly Ordnance vehicles and cased supplies, Signal, Medical and CWS supplies were loaded with QM Class I, II and IV to fill odd space. On ships carrying preponderantly Engineer equipment and boxed supplies, filler cargo was QM I - II and IV items. On ships carrying preponderantly QM Class I, II and IV supplies vehicles were added to the limit of the ships' cubic capacity. These ships carried all QM I, II and IV not loaded on the first two type vessels mentioned.

116. Regulating Stations.

a. ADSEC had a Regulating Officer and Regulating Station in support of each of the First, Third and Ninth US Armies. The Regulating Officer maintained his position at the office of the G-4 of the Army supported in each instance, and the Regulating Station was posi-

tioned where it could best perform its mission.

b. The mission of the Regulating Officer was to maintain close liaison for all ADSEC functions with the Army concerned, determine the requirements of the Army supported and supervise the operations of the Regulating Station.

c. The Regulating Station was charged with receiving requisitions from the Army and forwarding supplies to Army dumps. The planned mission of the Regulating Station, after submission of requisitions to issue depots, was to follow the movement of supplies through the rear areas to the point where they would be delivered to the Regulating Station's control. This operation was entirely dependent upon the receipt of detailed advance information which often was not available. To permit the controlled movement of supplies to Army dumps, the Regulating Station controlled all rail movement in the area through which only movements of the Army supported took place. The Regulating Station controlled the movement of Line of Communications motor transport in the Army area.

d. Since each of the G-4's of the Armies operated differently, the detailed operation of the Regulating Officers and Regulating Stations varied in many details, and in each instance the Regulating Officer and Station did actually perform a valuable function in the operation of ADSEC. ADSEC, G-4 controlled all movement of supplies on routes over which shipments were made to more than one Army. The information that was available to ADSEC on movements to the rear of, or in, ADSEC areas was made available to the Regulating Officers.

e. The Regulating Stations were not designed exactly to perform the work which they were called upon to perform. The necessary extra personnel, if available, were attached to assist. Throughout the campaign railway facilities were never adequate for any Regulating Station to be able to marshall trains or supplies in marshalling yards and forward selected materials to any point. Supplies as requisitioned and shipped were received, recorded, and forwarded to Army unloading points. It is believed that future operations will be such that circumstances will dictate a similar practice.

f. COMZ (See Chapter 11) operated no Regulating Station in the sense that was contemplated in Section VII, FM 100-10, but the G-4 Section actually accomplished the identical mission to a highly satisfactory degree. A liaison representative of COMZ, G-4, and each principal Service Section was located at the Headquarters of the Seventh US and the French First Army.

119. Supply of US Air Forces.

a. United States Army Air Forces in the European Theater at the close of 1944 possessed approximately 10,800 planes of various types, and a personnel strength of approximately 450,000. The logistical support of their operations was a joint Army Air Force and Service Forces responsibility, as the items of supplies common to both Ground Forces and Air Forces were provided by the Service Forces, and the items peculiar to the Air Forces were the responsibility of the latter Service. In many instances even the supplies common to both Air Forces and Ground Forces arrived in the Theater specifically consigned to the Air Force itself. On the Continent itself, the tonnages of the supplies to the Air Forces of items common to both Air Forces and Ground Forces were not segregated.

CHAPTER 13

ORGANIZATION AND FUNCTION OF COMMUNICATIONS ZONE IN ETO

120. General. The overall organization of the Communications Zone of the European Theater of Operations was the product of War Department directives, policies, manuals, and comprehensive studies which had been in process of development since the General Staff of the United States Army was first organized by Secretary of War Elihu Root in 1904. Much valuable experience was gained in the First World War from 1917 to 1920, and the existing structure of Com Z, as it functioned in the European Theater in this second World War was based upon that experience to a considerable degree. Generally, it consisted of Com Z Headquarters, two Advance Sections, one operating directly behind each of the two Army Groups throughout the operation, one intermediate base section, and at the peak of the operation six base sections located in the vicinity of the larger ports of France. All of the sections which operated in France had had more or less preliminary experience in the United Kingdom or in the Mediterranean Theater. The geographical areas occupied, the changes in their function as the operation developed, and the major features of each are covered elsewhere in detail in this report.

121. Sub-Division of Headquarters Staffs. Each of the various types of sections in Com Z was generally organized on a parallel basis similar to that of Com Z itself, with a Command Group, the General Staff Group, 8 Service Sections and 11 administrative sections. These several groups varied in some minor degree throughout the theater. Civil Affairs was a General Staff Section, G-5, throughout the operation, having been so organized several months prior to D-Day in the Northern operation but not until November, 1944, in the Southern operation, both functioning in close coordination with G-4.

122. The Service Sections.

a. Inasmuch as the subject of this report is confined generally to supply and maintenance the principal portion of the factual data and discussion is limited to the functions of the G-4 Sections and the eight service sections which performed the service and maintenance. These are the Quartermaster, Ordnance, Engineer, Chemical Warfare, Signal, Medical, Transportation and Provost Marshal's Sections. Under the close supervision and coordination of the Assistant Chief of Staff, G-4, of each headquarters, these services performed their normal functions as prescribed in the field manuals and policy directives, plus a myriad of other functions which developed as the operations were initiated and continued. Following is a brief outline of the major functions of each:

(1) Quartermaster. Acquisition, storage and distribution of rations, clothing, POL, operation of special type service companies, operation of depots, salvage and renovation.

(2) Ordnance. Acquisition, storage and distribution and maintenance of weapons, ammunition, mechanical equipment and motor vehicles, and salvage.

(3) Engineer. Rehabilitation and maintenance of ports, highways, bridges and canals; construction and repair of structural housing, salvage of local facilities, construction of fortifications and air fields, and acquisition of real estate.

(4) Chemical Warfare. Acquisition, storage, distribution and maintenance of all equipment used in offensive and defensive gas warfare, renovation of certain items of equipment for other services, and the tactical employment of smoke.

(5) Signal. Construction, installation and operation of all mechanical means of communications, rehabilitation and salvage of local signal facilities.

(6) Medical. Operation of all hospitalization and evacuation of personnel, control of sanitation, development of local health measures.

(7) Transportation. Control and operation of all railroads, ports, water borne and airborne transport, and operation of motor vehicle transport. The Military Railway Service operated as a service command under control of the Transportation Section of Com Z.

(8) Provost Marshal. Control of highway traffic of all types, maintenance of order, custody of prisoners of war.

b. Each service section of all of the echelons of Com Z contained many organizations of special types for specific purposes. The phasing of these units, in order that each organization would be at the proper place at the right time to perform its special function, was a most complicated matter, and required a high degree of knowledge and experience on the part of the key planning personnel as well as the key operating personnel. It is believed that no single operation in all history, either military or civil, has ever required such a complicated and highly coordinated set of plans as that provided for the movement of the American Expeditionary Forces from the United States to Great Britain or the Mediterranean Area, and then into an occupied country in the face of hostile opposition. Com Z and its thousands of subordinate service units had a large part in the success of this operation. To be sure, many mistakes were made requiring changes in plans; the prearranged efforts of service units were often wasteful and ineffective, due to lack of precedent and experience, unforeseen developments, and, to some extent, to outright inefficiency. In the overall picture, however, Com Z and its services rose to unprecedented heights in innumerable instances, by careful and meticulous planning and supreme effort, when the occasion demanded. Many service units in the echelons of Com Z were constantly on the move in their need for keeping up with the rapid advance of the combat forces, while many others remained in their initial locations on the Continent, where they performed their prescribed functions throughout the operations.

123. During January and February 1945. Thirteen French Light Infantry Battalions were made available for use as security and guard troops. These battalions were used to guard vital points in the Base Sections so that US troops could be relieved for forward areas. Generally they were employed at the following points: Coast Defense, POL pipe line, Bridges and Tunnels, Electric Power Plants, Depots and Dumps, POW stockades and Railway Yards.

CHAPTER 14

BRIEF HISTORY OF THE BASE SECTIONS

124. Normandy Base Section.

a. The first Base Section was established on the Continent 21 July 1944 when Headquarters Cherbourg Command (Prov) was created; on 7 August 1944 this command was abolished and Base Section No. 3 (Cherbourg Base Section) was established. On 16 August 1944 Base Section No 3 was redesignated Normandy Base Section.

b. Territory now covered by this Base Section necessitated the establishment of Districts and on 6 October 1944, the Granville, Omaha and Utah Districts were established. On 27 November 1944, Utah and Omaha district boundaries were extended and the Granville District dissolved. (Appendix 3 and 11).

c. On 1 February 1945, NBS boundaries were extended to cover all territory south of the Somme River formerly occupied by Channel Base Section and on 10 February 1945, Normandy absorbed the Brittany Base Section area. On 11 February NBS had established the following districts: Northern, Western, Southern and Beach Districts (See Appendix 3). Headquarters NBS was moved from Cherbourg, France to Deauville, France, on 18 February 1945, and to Brussels, Belgium on 1 July 1945, where it absorbed the balance of the Channel Base Section operations and accordingly the Base Section area was changed from Normandy to Channel (Combination of Channel and Normandy).

125. Brittany Base Section was activated in UK as Base Section No 1 and moved to the Continent in August, 1944, with Headquarters at Rennes, and was redesignated Brittany Base Section on 16 August 1944. The adjoining area of Loire Base Section was absorbed in December 1944 and Brittany Base Section area was absorbed by Normandy Base Section on 10 February 1945. A great portion of the headquarters personnel of this section moved to the Burgundy District of COMZ and on 21 March 1945 was absorbed by Oise Intermediate Section, and became Lorraine District.

126. Loire Base Section was activated in the UK as Base Section No 2 and moved to the Continent in August 1944, established headquarters at Le Mans, and was redesignated Loire Base Section on 22 August 1944. This section operated only a few months and was absorbed by Brittany Base Section in December 1944.

127. Seine Base Section had been the Central Base Section in London, moved to the Continent as such, established headquarters in Paris and was redesignated Seine Base Section on 26 August 1944.

128. Channel Base Section was activated in the UK as Western Base Section. Officially, the origin of Channel Base Section was on 24 August 1944 which was established as an Intermediate Section of Com Z. On 2 September 1944, Headquarters was established at Fontainebleau, approximately 30 miles south of Paris. On 5 September it was redesignated Oise Base Section and on 15 September was redesignated Channel Base Section, and on 19 September, established its headquarters at Le Havre. On 27 November, its headquarters moved to Lille, France, and on 22 October, four districts were established, "A", "B", "C", and "D". On 1 February 1945, it relinquished territory south of the Somme River to Normandy Base Section. Channel Base originally set up the first staging camps near Le Havre, Lucky Strike, and Twenty Grand. On 1 July 1945, Channel Base was absorbed by Normandy Base Section and the combination became Channel Base Section.

129. Oise Intermediate Section was originally activated on 15 September 1944 as Oise Base Section and was redesignated Oise Intermediate Section on 2 April 1945, with Headquarters at Reims. The mission of Oise Section was to progressively relieve Advance Section of the Communications Zone activities in the area relinquished by Advance Section east of the Seine. On 23 March 1945, Burgundy District was redesignated Lorraine District, and later, on 5 April 1945, Oise was divided into three districts, Marne, Luxembourg and Lorraine. However, Luxembourg District was in existence only a little over a month. It was established on 5 April 1945 and inactivated 12 May 1945, its area reverting to the Marne District. Oise opened the first transient mess for truck convoys at Reims, referred to as a "Hot Dog Stand". The construction of 17 camps for 270,000 men capacity in the Redeployment program, known as the Assembly Area Command, was initiated 1 April 1945, and was in various stages of completion during the summer and autumn of 1945, in the vicinity of Reims.

130. Delta Base Section was activated 1 October 1944, transferred from Corsica and occupied the south of France. The Marseilles area was set up 1 November 1944 and expansion of the base section necessitated the establishment of the Mirande Dept area 15 December 1944 and the Lyon and Riviera areas on 29 December 1944. The organization of this section is covered in detail in Chapter 11, paragraph 94 g.

131. Advance Section, Communications Zone. Headquarters ADSEC, Com Z, was officially activated in February 1944 at London, England, and subsequently moved to Bristol, England, in order to be closer to the headquarters of the First US Army and to avoid the congestion and confusion of London. Upon arrival in Normandy, France, initial headquarters was established near Grand-camp-les-Bains on 9 June 1944 and on 23 June moved to Catz. On 20 August the headquarters moved to Le Mans, to Etampes 30 August, Reims on 8 September, Namur, Belgium on 25 October, Bonn, Germany on 7 April 1945 and to Fulda, Germany, 6 May 1945, where the section was deactivated on 10 July 1945.

132. Continental Advance Section. Continental Base Section was activated in Italy on 7 July 1944, landed in Southern France 23 August 1944, and opened for operations in Marseilles 1 September 1944. Due to rapid forward movement of the Seventh Army, it was decided that Continental Base Section would become Continental Advance Section, which was established at Dijon, 1 October 1944, as COMLD. In February 1945, Brittany Base Section headquarters moved to Dijon and became the Burgundy District of COMLD, at which time COMLD headquarters moved to Nancy. In March, Burgundy became a district of Oise Intermediate Section. On 3 April 1945, COMLD moved to Mannheim, Germany, and was deactivated on 15 July 1945. (Further reference, Chapter 11, Operation "DRAGOON".)

133. See Appendix 12 for the geographical organization of the Communications Zone, ETOUSA, on VE-Day.

CHAPTER 15

SUPPLY AND DISTRIBUTION OF PETROLEUM PRODUCTS (CLASS III)

134. Basic POL Plan as of D-Day.

a. The plans for the supply and distribution of POL to support continental military operations were designed to meet the tactical requirements of the "OVERLORD" and "POST OVERLORD" Operations for the invasion of Europe. In the earliest planning stages it became obvious that to meet unprecedented military requirements of the operation the standard orthodox methods for distribution of fuel in great volume would necessarily need to be materially supplemented. It was there that the theory of bulk fuel distribution, embodying the use of temporary military pipe line systems on a gigantic scale, was introduced and accepted. The planned construction of the distribution systems, therefore, was accordingly projected so that the phased capture of the major ports outside of the initial lodgement area could be fully expedited from a POL standpoint.

b. Balanced Supply of POL. Because gasoline requirements in a modern military operation roughly constitute 85% of the total POL consumption, the supply and distribution problems treated in both plans and operations are chiefly concerned with handling motor and aviation gasoline. The breakdown of the balanced supply of POL as to other items such as oils and greases is contained in the following War Department Table for

ITEM	PER CENT
MT 80	85.27
Diesel	10.00
Kerosene	.30
Oil, Engine	3.30
Gear Oil	1.10
Grease	.03
Total Balanced Supply	100.00%

Note: Proportion of aviation gasoline for the Air Force was about 20%, oil 1.5% and greases .5%.

The above distribution was followed on all tonnage dispatched to the forward areas unless contrary instructions were received relating to one or more specific items.

135. ADSEC G-4 NEPTUNE PLAN.

a. The G-4 Plan of the Communications Zone, ETO, outlined ADSEC's supply mission and responsibility before and after D + 25 (establishment of Army rear boundary) with details pertaining to the supply of the Armies, Air Force, and the Navy. It specified that troops would arrive on the Continent with 5 days supply of Class III based on 25 miles per operational vehicle per day to D + 15, and 50 miles per day thereafter.

b. Reserves of Class III to be accumulated on the Continent by D + 41 consisted of three days' supply for all troops ashore. The construction of bulk POL facilities was planned to embrace two pipe line systems, which were designated as the Major and Minor systems. The Major system was to provide six six-inch lines at Cherbourg, five of which were for tanker discharge, and the sixth for the Cross Channel submarine lines, (which never became operational). From the storage area at Cherbourg two six-inch lines for MT 80 and one for aviation gasoline would be laid through La Haye du Puits, Coutances, Avranches,

Fougeres, thru Rennes to Laval, and one six-inch branch line for MT 80 would be laid south from Laval through Craon to Chateaubriant. Storage facilities at each point would be:

Location	10,000 Bbl tanks	5,000 Bbl Tanks	1,000 Bbl
Cherbourg	29	8	1
Le Haye du Puits		3	5
Coutances		9	
Avranches		2	
Fougeres		6	
Rennes		3	
Laval		8	
Craon		1	
Chateaubriant		1	
Total capacity	290,000 bbls	240,000 bbls	6,000 bbls

Grand Total = 536,000 bbls = 22,512,000 gallons

c. The Minor system was to have two six-inch lines at Port-en-Bessin and two ship-to-shore lines at St. Honorine des Portes, these being interconnected. At the former point were to be four 1,000 barrel and four 5,000 barrel tanks for MT 80, and at the latter point four 5,000 barrel tanks for Diesel, MT 80 and aviation gasoline. Included in this system also was a four-inch line at Ballerey, where storage of one 5,000 barrel and one 1,000 barrel tank was to be provided and to be completed by D + 16.

d. A QM Petroleum Products Laboratory was to be set up on D + 35, while actually it arrived 7 July 1944 (D + 31).

136. Operations D to D + 50 (Completion of St Lo Breakthrough Period).

a. Isigny opened as a port D + 11, Grandcamp opened D + 14 and Cherbourg opened D + 20. Plans at the port of Isigny and Grandcamp as well as at other small ports enabled the receipt of packaged POL products to be expedited and stock piles built up in the beach areas to cover all operations. At the port of Cherbourg, half a million barrels of storage capacity was captured almost intact. However, while setbacks were anticipated during the first month of the effort, not foreseen was a catastrophic storm which wiped out unloading facilities at Port-en-Bessin shortly after D Day. In spite of this, during the month of June bulk receipts at Port-en-Bessin amounted to 18,930 barrels of MT 80 and 2,990 barrels of aviation gasoline.

b. Port-en-Bessin And St Honorine des Portes was a joint operation with the British and at St Honorine two six-inch submarine lines, known as "Tombola Lines", were laid from a point approximately 4,000 feet off shore to an on-shore receiving, dispersing and storage point, all interconnected with the Minor System. Lines were also laid from this receiving terminal westward to the US Navy's fueling barge for small craft, located within the artificial harbor at the east end of Omaha Beach. The Major System started at Cherbourg with the laying of six-inch, eight-inch and twelve-inch lines from the Querqueville Dique tanker berth; the rehabilitation of storage facilities and installation of pump stations was all completed on 25 July and the first ocean going tanker was unloaded to storage tanks on the shore. During the remainder of the month of July the following bulk products were received:

Port-en-Bessin	311,765 barrels MT 80
Port-en-Bessin	51,880 barrels aviation gas
Cherbourg	101,290 barrels MT 80

c. During the same period there was moved forward by pipe line 99,250 barrels MT 80 and aviation gas. The Minor system was completed and in operation on 21 June 1944. The three six-inch lines from Cherbourg south were started immediately following the capture of the city on 27 June, but the system was not completed to any forward storage and dispersing point, during this period.

d. The following storage had been completed and in operation by this time:

Location	No of Tanks	MT 80 Capacity Bbls	No of Tanks	Aviation Gas Capacity Bbls	No of Tanks	Diesel Capacity Bbls	No Of Tanks	Total Capacity Bbls
Cherbourg	4	63,000	5	10,000	4	22,000	20	117
			4	5,000				
			2	3,000				
			1	1,000				
Port-en-Bessin	1	1,000	1	1,000			2	2,000
St Honorine	1	10,000					5	30,000
	4	5,000						
Etrehamo	2	5,000	2	10,000			6	45,000
	1	10,000	1	5,000				
Balleroy	3	5,000					4	16,000
	1	1,000						
Carentan			7	570			7	1,000
Totals	17		23		4		44	514,000

e. After the St Lo breakthrough 26-29 July, it became apparent that the necessity for running lines south to Laval and west to Rennes and Chateaubriant was of secondary importance due to the limited and localized resistance on the Brittany Peninsula and along the Loire River. Accordingly the route of the pipe line was changed and beginning at Lessay (just south of Le Haye du Puits), the new route turned southwest to St Lo. New Plans were made with Le Haye du Puits, St Lo, Vire, Domfront, Alencon, Chartres and Dourdon as the principal fuel storage and dispersing points west of the Seine River.

137. POL Distribution Operations.

a. At the time POL activities first began on an operational basis on the Continent, the Allied land holding was small and all territory was in the hands of First US Army which controlled the beaches and all the POL products on the Continent. ADSEC opened its first Class III Dispersing Point on the Continent, at Cherbourg on 1 July 1944. This DP was closed on 9 July when the two permanent Cherbourg installations were opened. This dump was supplied from Utah Beach until 9 July when truck shipments began to come in from St Vaast.

b. Tonnage of packaged POL coming in over the beaches and through Cherbourg is shown in the following table:

Month	Omaha	Utah	Cherbourg	Total
June 44	23,490	13,190	0	36,680
July	36,825	23,320	240	60,385
August	11,615	6,860	1,850	20,325
Sept	15,735	11,330	1,880	28,395
Total Ton	87,715	54,700	3,970	146,385

c. Tonnage of packaged and bulk POL shipped forward was:

Month	PACKAGE Rail	PACKAGE Truck	PACKAGE Total	Bulk Pipe Line	GRAND Total
June 1944	0	0	0	0	0
July	0	0	0	11,030	11,030
August	15,090	52,265	67,355	605,575	672,930
Sept	75,830	29,435	105,265	341,725	446,990
Total	90,920	81,700	172,620	958,330	1,130,950

d. By the end of this period the following tankage had been constructed:

Location	No	MT 80 Capacity Barrels	No	Av Gas Capacity Barrels	No	Total Capacity Barrels
Lessay	1	1,000			1	1,000
St Lo	4	10,000	2	5,000	6	50,000
Domfront	3	5,000	1	10,000	4	25,000
Vire	1	1,000			1	1,000
Chartres	2	5,000	1	5,000	3	15,000
Le Forge	1	1,000			1	1,000
Totals	12	------	4	------	16	93,000

e. The First US Army began to turn over POL installations to ADSEC on 16 July when it received the Utah Beach Dispersing Points. total of seventeen installations were opened by ADSEC or taken over from the First and Third US Armies, including those in the Utah and Omaha Beach areas. In addition to supplying ADSEC and the Ninth Air Force, and finally filling all requirements of First and Third Armies, the following stocks were turned over to Communications Zone in the beachhead area on 19 August 1944:

MT 80 Gasoline	15,257,455 gallons
Allied Products	6,793,630 gallons
Aviation Products	929,355 gallons
Total	22,980,440 gallons

138. Period from St Lo Breakthrough to Reaching the Seine (1-27 Aug).

a. By August, 1944, the major pipe line had reached Le Haye du Puits and a 5,000 barrel tank erected and the first major decanting site was put into operation that decanted in excess of 250,000 gallons per day. In addition to the one 5,000 barrel tank erected at that point, one 10,000 barrel tank was added giving a total tankage at that point of 15,000 barrels.

b. Red Ball Motor Transport is covered elsewhere in this report and is mentioned here only to show that it transported in excess of 106,000 tons of packaged POL products during its period of eleven weeks' operation.

c. The construction of installations on the major system south and west of Cherbourg had been initiated prior to this period and had been completed as far as Bourdon. By the end of September, surveys were completed to Coubert, which was to be the site of the first tank farm and dispersing point east of the Seine River. Pump stations were located and under construction and the Seine River Crossing, which included six lines laid on the bottom of the river, was under construction.

d. As was the case, during the rush after the breakthrough for ammunition, rations and packaged POL, pipe line construction material was not given priority for shipment forward, hence there was a delay in constructing the pipe line. Until such time as priority could be secured for rail transport, it was necessary that organizational transportation supplemented by a small amount of transport furnished by QM truck companies, move all equipment used in POL construction from the beaches and dumps to construction sites.

e. On 27 August ADSEC opened a POL dump at Le Mans with a decanting capacity of 200,000 gallons per day and on 27 August opened a package dump at Ablis. On 13 September a pipe line was completed to Chartres. On 14 September a package dump was opened at Soissons. On 24 September one pipe line was completed to Dourdon and on 30 September a package dump was opened at Reims.

139. Seine Crossing to the German Border (28 August - 7 November)

a. On 14 September the first bulk POL was flown into army decanting points. First US Army airstrips located at Florennes, Jumaine, Belgium and Clastres, France and Third US Army airstrips located at St. Disier, France were designated to receive the first shipments. Approximately 100,000 gallons were flown to each airstrip each day. A total of 1,906,800 gallons MT 80 was received in this manner.

b. On 23 Sept 1944, all bulk POL construction and operation was assigned to the Military Pipe Line Service, directly under control of the Commanding General, Communications Zone.

c. Bulk gasoline received on the Continent through the Major and Minor systems, August and September 1944, was:

Date	Port-en-Bessen	Cherbourg	Morlaix	Total
August	534,735	967,869	0	1,502,604
September	482,120	1,229,573	28,526	1,740,219
Total Bbl	1,016,855	2,197,442	28,526	3,242,823

140. Preparation for a Winter Offensive, the German Counter Offensive, Preparation for Spring Offensive, 1 Oct to 28 February 1945.

a. The status of ADSEC's dumps as of 1 October was 1,205 tons of POL, the balance being in Com Z dumps in the rear area. On 1 December the situation had improved considerably, being 29,070 tons of POL and 9,550 tons of solid fuel. On 1 February 1945 the status was; POL 23,465 tons, solid fuel 2,455 tons.

b. The ports of Le Havre and Rouen had not yet been opened to full capacity and the burden on strained supply lines was very apparent. Antwerp appeared as being a solution and was placed in operation for POL the latter part of November.

c. At the start of the Armies' January push forward after the Ardennes "Bulge" they were using from 750,000 to 1,500,000 gallons of gasoline per day and with all the supply troops and installations involved in the operation, this required bringing forward of over 2 million gallons of POL daily.

d. The following stocks of MT 80 (with balanced allied products) were on hand as of 15 December 1944, throughout the forward areas.

First US Army Dumps 3,498,520 gallons

Ninth US Army Dumps	3,578,850 gallons
Third US Army Dumps	3,090,260 gallons
ADSEC North	4,013,700 gallons
ADSEC South	5,285,025 gallons

This was more than a five days supply for First and Ninth Armies and more than a nine days supply for Third Army.

e. In addition to the above, there was stored at Namur at the same time for the Ninth Air Force, 537,200 gallons of Aviation gas in 55 gallon drums, and 96,500 gallons aviation oil.

f. During the month of January, 1945, the tactical situation eased the pressure around Liege and in the northern area, decanting was resumed at Liege and trains of POL began arriving from Antwerp.

g. A Northern NT 80 pipe line, consisting of one six-inch pipe and two four-inch pipes was constructed from Antwerp to Maastricht and completed on 9 February, later being extended to Wesel, Germany.

h. The decanting points in operation 28 February 1945 in addition to others already mentioned were:

Decanting Point	Gallons per day
Liege	300,000
Froez	200,000
Autobahn (Moerbeck)	300,000
Lutterade	200,000
Laudres	300,000
Marcieulles	300,000
Total daily capacity	1,600,000 gallons

i. Packaged POL received 1 Oct 44 thru 28 February 1945.

Month	Omaha	Utah	Cherbourg	Le Havre	Rouen	Antwerp	Total
Oct 44	6,540	4,395	5,670				16,605
Nov	1,105	1,925	1,605				4,635
Dec	1,150	350	2,050			250	3,800
Jan 45			510			59,995	60,505
Feb			5,900	1,370	3,435	33,950	44,655
Total Tons	8,795	6,670	15,735	1,370	3,435	94,195	130,200

j. Reconnaissance of the Seine River to Paris had revealed a sorry condition. Bridges were blown and huge structures obstructed the channel at intervals all the way to Paris. The US Navy cleared this channel for barge traffic from Rouen to Paris for the vitally needed POL supplies, for US forces as well as the utility industries of Paris; inauguration of this barge traffic was started in November and was of vital relief on the hard pressed supply system on the Normandy peninsula. 525,000 barrels storage were found intact at Rouen in British territory and an agreement was reached for its joint use. This storage was initially fed by small tankers from England, by a six-inch line from Cherbourg and later when Le Havre was sufficiently rehabilitated to receive tankers, by trans-shipment from that port and from Port Jerome. A 10-inch French line from Le Havre to the Port Jerome refinery fed the latter storage with motor gasoline and a tanker shuttle system was set up between the refinery and the storage at Rouen. This hybrid system became an important source of fuels for Seine River delivery to Paris, whereby most of the civil requirements as well as the area Air Force and motor gasoline requirements were filled.

k. The total bulk POL received on the Continent at all ports from 1 October 1944 thru 28 February was as follows:

BARRELS

Month	Port on Bessen	Cherbourg	Le Havre	Antwerp	Morlaix	Petite Couronne	Port du Bouc	Ostend	Calais	Total
Oct	189,125	1,952,450	0	0	92,280	81,910	0	115,490	0	2,431,255
Nov	69,285	1,315,915	163,585	0	7,600	425,490	665,895	239,340	0	2,887,110
Dec	44,320	1,346,070	258,815	541,215	5,185	268,710	589,000	117,825	0	3,171,140
Jan	41,825	980,625	247,295	862,030	0	218,965	1,017,380	0	77,865	3,445,985
Feb	240	953,325	203,735	937,755	0	77,465	778,055	0	61,775	3,012,330
TOTAL Bbls.	344,795	6,548,385	873,430	2,341,000	105,065	1,072,540	3,050,330	472,655	139,640	14,947,820

141. The 1945 Spring Offensive 1 March to 9 May 1945.

a. After the experience of the rapid advance across France and Belgium great emphasis was placed on adequate planning for POL supply in the advance to and across the Rhine. The success of this planning and its execution was well proved by the steady advance of the armies and the lack of any POL shortage at any time during the remainder of this campaign. In February, 1945, approval was received to expand the pipe line systems and extensionswere authorized from Maastricht, Paris and Sarrebourg to the Rhine River. Sarrebourg enters the picture at this time by reason of the invasion of Southern France on 15 August 1944. A six-inch and four-inch line had been constructed north from the port of Marseilles for the support of the US Seventh and the First French Armies and was now playing a most vital role in the integrated POL supply system.

b. The Engineers had accumulated the materials for three Rhine River crossings, Wesel, Mainz, and Mannheim. A target date of 30 April was placed on the construction of about 1,100 miles of pipe line, pumping stations, and related tankage, some of the construction of which was over the roughest terrain yet encountered. The Wesel crossing was completed about 30 March, the Mainz crossing was completed about 23 April, and the Mannheim crossing was completed on 14 April, all pumping to the east shore of the Rhine. No attempt was made to con construct pipelines beyond the distributing points on the east bank of the Rhine. With the completion of the pipe lines to these Rhine crossings, planned pipe line construction was finished. (Appendix 13). 3,500 miles of pipe lines had been constructed, transporting 78,000 barrels of gasoline daily from Port areas to the east of the Rhine River. The material in all these pipe lines weighed 137,000 tons. It easily paid for itself in the tonnage saved every fourteen days when 8,500 tons of POL were moved daily without the turn of one wheel of rail car or truck.

c. The finished distribution system, Major, Northern and Southern was capable of carrying 150,000 barrels of gasoline per day to our armies and air forces during the peak consumption period of April 1945, when on some days over one and one quarter million gallons of gasoline were burned up by our air force and four and one half million gallons per day by our armies. To meet this fabulous requirement US Military had pressed into service 3,500 tank cars, 1,056 tank trucks, most of which were of 2,000 gallions capacity; 144 cargo trucks each with four 750 gallon skid tanks mounted on trailers; had imported 19 million 5 gallon returnable cans (jerricans) and one half million 55 gallon drums; used 120 river barges; maintained and operated seven and one half million barrels of bulk storage for all bulk products handled; discharged a fleet of 86 tankers in constant service from the US and UK, exclusive of the supply from the middle east; operated a pipe repair depot, a can repair depot, six mobile and six static petroleum testing laboratories; and kept 10,000 men busily engaged in construction, storage, operation and distribution.

d. Early in April, 1945, there was instituted an air lift by C-47 aircraft to the Third Army in Bavaria. 3,600 planes were loaded with 2,766,000 gallons of motor gasoline in 5 gallon cans to cover one five day period, this supply being necessary to support the tank spearheads far beyond the reach of our normal line of supply.

e. (1) The railroads moved 517,000 tons of bulk and packaged POL in March, 1945, which constituted approximately 30% of all tonnage handled by railroads in Allied territory.

(2) The storage tanks of the Military Pipe Line Systems, held on a normal day, as many barrels of petroleum products, as were required for the American Army in France and Belgium during the entire period of World War I.

(3) Recovery of the Military Pipe Lines. The pipe line equipment of the Minor system was taken up Nov 44, the Major System in Jun 45, the Northern System in Dec 45, and the Southern System will be taken up Dec 45. All equipment has been or will be stored in Engineer Depots, pending ultimate disposal.

(4) Some of the pipe line equipment in the European Theater was, at the time of the Japanese surrender in August, 1945, already in process of transshipment to the Pacific area.*

142. The Southern Military Pipe Line System (CONTD).

a. This system started at Marseilles (Port du Boue) in early September, 1944, and followed the Rhone River, thru Avignon, Lyon, Macon, St. Jean de Losne, Epinal, Sarrebourg, Sarralbe, Frankenthal and Sandhafen, crossing the Rhine River near Mannheim. The cities listed above were the principal storage points along the system. This system consisted of one six-inch and one four-inch line from the Port du Boue terminal to Sarrebourg where three four-inch lines continued to the terminus of the line, the total length being 1,507 pipe line miles.

b. On 15 August 1944, the first Engineer Petroleum Distribution Company landed on the beach near San Rafael, on the Riviera. Almost at the beginning the shortage of gasoline was critical. The first 10,000 barrel bolted steel tanks erected in three days and three such tanks were erected less than one mile from the beach where a decanting plant and a tank truck loading rack were installed. In order to bring gasoline from the tankers off shore to these facilities it was necessary to build a line to where the tankers were at anchor, the marine lines being supported by laying them across float barges between the shore and the ships.

c. In the meanwhile an advance party had been sent to Port du Boue, west of Marseilles, even before the ports of Toulon and Marseilles had been taken by the Allied Forces. A total of two million barrels storage was located at three refineries in Port du Boue, with only minor damage incurred. They were rehabilitated by D + 14 although the actual storing of gasoline was delayed nine additional days due to mine clearing operations in the harbor. Storage at this point actually reached one and one half million barrels.

d. (1) The hazards of weather, sabotage, enemy attacks and the black market leeches (who tapped the pipe line) all confronted the pipe line operations during the building of the line and for a great while afterwards; however, supply of gasoline thru the pipe line was never halted.

(2) The greatest single obstacle overcome was when high water flooded the Rhone River in the Autumn of 1944. The winter of 1944-45 was one of the most severe on record in the Rhone Valley.

(3) There was only one record of major sabotage, that of actually uncoupling the line near Avignon, where some two thousand barrels of gasoline were lost.

* Sub-paragraphs (5) and (6) will be found on the following page.

(5) Packaged POL received at the main ports 1 March to 31 May 1945 were as follows:

Month (Tons)	Le Havre	Cherbourg	Rouen	Antwerp	Total
March	10,725	2,910	18,830	27,990	60,455
April	2,890	4,240	17,835	20,740	45,705
May	885	——	6,985	13,445	21,315
Total (Tons)	14,500	7,150	43,650	62,175	127,475

(6) Bulk POL received on the continent 1 March 45 thru 31 May 1945:

Month	Cherbourg	Le Havre	Antwerp	Petite Couronne	Port du Bouc	Calais	Toulen	Total
March	1,232,420	164,975	1,157,970	125,860	1,273,570	240,285	34,800	4,229,880
April	970,745	612,975	1,699,880	51,975	0	0	0	2,735,575
May	1,221,335	343,170	1,711,505	238,615	2,743,930	86,575	12,215	6,357,345
Total Barrels	3,424,500	1,121,120	3,969,355	416,450	4,017,500	326,860	47,015	13,322,800

Black marked thieves in Southern France stole more gasoline from the pipeline than was ever lost due to sabotage, as thousands of tiny holes were drilled in the lines for the purpose of extracting gasoline; in one month as many as six thousand barrels of gasoline were lost solely due to tapping of the line.

e. At the northern terminus of the line, Mannheim, a storage capacity of over 16,000 barrels was established in April, 1945, also a decanting area and tank car loading rack. On VE Day the pipe line was delivering to the Seventh Army 850,000 gallons per day and to the French First Army 300,000 gallons per day.

f. Total storage capacity constructed by Army Engineers in the Sixth Army Group area in addition to existing facilities, was 3,527,330 barrels.

143. Total POL handled on the Continent D Day through May, 1945.

Month	Bulk, Barrels	Packaged, Tons
June 1944	21,900	36,680
July	464,935	60,395
August	1,502,605	20,325
September	1,740,220	28,995
October	2,431,255	16,605
November	2,887,110	4,635
December	3,171,140	3,300
January 1945	3,445,985	60,505
February	3,012,330	44,655
March	4,229,880	60,155
April	2,735,575	45,685
May	6,357,345	21,315
Total	32,000,280 Barrels	404,040 Tons

÷ 8 bbls to a ton = 4,000,035 tons

X 8 bbls to a ton = 3,232,320 bbls

GRAND TOTAL ---------- 4,404,075 tons
or ---------- 35,232,600 barrels

NOTE: -- includes lubricating oils and greases, however, 85% of packaged products was gasoline and 8 barrels per ton is considered a fair estimate.

144. Conclusions. In spite of the many difficulties encountered in the first phases of the invasion, the speed with which great stocks of POL were brought ashore was miraculous. Captured storage and disbursing equipment with appurtenances thereto, at Cherbourg, Rouen, Antwerp, and Marseilles (Port du Bouc) aided tremendously in the supply problems of POL. The thousands of barrels of gasoline that were transported to the forward areas by the Military pipe lines, which enabled our armies to always press forward was one of the military marvels of this campaign. Thus the Military Pipeline, with its colossal steady supply and moderate maintenance, has firmly established its place in the logistical support of the field forces of the present day.

CHAPTER 16

CIVIL AFFAIRS

145. Definition. Civil Affairs supplies are those military items which will be used by the commander to meet his civil affairs responsibilities, i.e., civilian, captured enemy or "common user" military items, including food, clothing, medicine, transportation, and other minimum necessities for the welfare of civilians. The supply objective is to insure that the population has sufficient food, clothing and other supplies to maintain the minimum standard of living, as defined by higher authority. To accomplish this objective, the area commander must make the maximum use of local resources and where they are inadequate, supplement them by furnishing civil affairs supplies from military stocks under his control.

146. Mission.

a. The combat mission of the Armies of the United States in northwest Europe required that certain friendly countries be entered and therefore the military mission carried with it an auxiliary mission requiring that peace and order be maintained in both liberated and occupied areas. It should be understood at the outset that this minimum civil mission was a command responsibility for all senior commanders - but it was specifically directed that major rehabilitation of liberated countries should not be undertaken, and that civilian assistance was to be limited to that required by military necessity only. All US organizations in the European Theater of Operations were governed by this mission, and therefore since civil affairs had been made a command responsibility, all services were responsible for their part; for example, the Quartermaster for requisitioning, receiving, storing and issuing imported civilian supplies; the Transportation Corps for movements; the Engineers for such rehabilitation as was necessary, and so forth.

b. Each senior headquarters had a general staff section headed by an Assistant Chief of Staff, G-5, to supervise this function.

c. The units for local duties in the field were obtained from the European Civil Affairs Division. It numbered approximately 2,500 officers and 5,000 enlisted men. The companies of this Division were normally attached to the Armies, which dropped off detachments in towns and cities as they advanced, thus laying a carpet of civil affairs detachments across the liberated countries. These detachments during the early days of the liberation were a great boon to the liberated people. They were a field organization only, and the policy for such matters had been set up at the general staff level and the supply problems and necessary rehabilitation were handled by the services.

147. Food the Primary Need.

a. The main objectives of the Commanding General, Communications Zone, in France, were to establish the French national government firmly in Paris, assure that the people of France had sufficient food so that there would be no unrest in the Zone of Communications and to see that the essentials of governmental necessity, such as transportation and utilities, were turned over to the French national authority as soon as the military situation would permit, in order that it might be a government in fact as well as in name.

b. Before leaving England a procedure called "Plan A" was prepared in conjunction with the War Department, setting forth the

supplies that might be needed in France if the step-by-step advance across France, then considered possible, had to be made. When the armies broke through in Normandy and quickly advanced to the Eastern French frontier, crops were found in the ground ready for harvesting and considerable stocks of certain indigenous food in the country. The problem of supply of our armies over the open beaches in Normandy and through the broken port of Cherbourg, with only one railroad from Normandy and that not yet into Paris, posed such a supply problem that it was a question of halting the advance of our armies or importing food for France. With some articles of food fairly plentiful in France, only one decision was possible and that was made - to postpone imports and take immediate steps to exploit to the utmost French indigenous food supplies. Agricultural experts were sent into Normandy and Brittany to assist the French local authorities in their food collection and distribution to Paris and other large cities, with the result that there was sufficient food to meet minimum needs, except fats and certain items in world shortage.

c. The Allies brought into the Continent from all sources 630,000 tons of food, of which about half or less was given to the French, the rest to Belgium, Luxenbourg and Holland. Large stocks which were built up in the forward depots were issued to hundreds of thousands of displaced persons, which created the largest drain on those particular stocks. Contrary to popular opinion, it was found that there was an adequate but not plentiful stock of food in France, except for certain items, chiefly meats, fats and butter.

d. The carloadings were watched very closely, in order to control carefully the number of cars which were respectively loaded for the US and British Military forces and for the civilian populations. The carloadings for the Military forces were, in May, 1945, between 30 and 36 per cent of the total loadings each week. Considerably more movement of food products was going to the French economy than to the military effort at that time and that condition had existed since February, 1945. The highest variation between February and May was 39% for the Military forces.

e. The first month following the liberation of Paris, September, 1944, the Allies assisted the French to bring in 130,000 tons of food from indigenous sources. That was stepped up the following month to 190,000 tons of food, but it was impossible to maintain that rate, however, because of the longer lines of communications to the armies.

f. The use of indigenous food from the fields had enabled most of France to have the minimum food supply needed. In the south, however, the problem was a little different. There is less cultivated ground in southern France, and it was necessary to import a considerable amount of wheat for Marseilles in the south.

g. Transportation was the limiting factor in the amount of food that could be distributed throughout France, and there was a brief shortage of food supplies in Paris from time to time because of this factor. During the winter one setback was caused by the German counter-offensive in December, which disrupted transportation throughout Northern France and Belgium.

h. On 31 May 1945 the French Government officially took over the feeding of the entire civil population. In effect, they had been doing this since the beginning. The US interest was vested more in supplementation of their indigenous foods, and in the methods of distribution. The latter had been accomplished to a large degree through their own distribution system, although prior to the time

when the National Government began to function, supplies were delivered to mayors of towns and cities, Regional officials and others in authority.

i. The only commitment of imports made was in November, when SHAEF informed the French that in the four months ending 29 February, the Communications Zone would import for French 223,000 tons of relief supplies. This commitment was met except for certain items due to world shortage, or to the delay of certain ships. It was completely filled in March, except for a few items still in world shortage.

j. Records of transfers of supplies were carefully kept. The practice was to turn over supplies at the national level and secure the proper signatures on receipts. There was a central accounting agency at each country's mission which received these receipts and charged them against the country concerned on lend-lease arrangements. Before the National Government in France was set up, receipts had to be taken first from local mayors, then from regional officials, but these were turned over by the SHAEF Mission to France for governmental accounting, as were the receipts from the national level at a later date. In May 45, the French were given complete responsibility for all French imports except petroleum and coal.

k. When the French National Government was brought to Paris, it was as completely cut off from the rest of France as if it had been on one of the Channel Islands. All rail communications outside the capital had been cut by the bombing activities of the liberation. Canals were blocked; power lines destroyed; telephone and telegraph lines completely disrupted and post office service non-existent. There was practically no coal for utilities, no gasoline and there was no contact of any kind between Paris and the rest of France. In short, all the means needed by the French National Government to govern were absent from the picture. Within the three or four months following the liberation, the situation was sufficiently restored so that there was released to the French Government by the strenuous efforts of all the Com Z services concerned - namely, Transportation Corps, Signal Corps, Engineer Corps, in all echelons of command of the Communications Zone - sufficient of their means of communication and transportation to enable the French National authority to carry on. This was being done at the same time that the great offensive against the Germans by the Allied Armies was being supported. In four to five months after Paris had been liberated in August, 1944, the Allies were able to see a great nation gradually take its place in the family of nations, sorely crippled to be sure, and weak, but growing stronger every day.

l. The problem in France was only one of the many civilian problems that the Armies and Com Z in Europe had to face. They had to meet the civilian supply requirements in southern Belgium, the southern Netherlands and Luxembourg, and large quantities of relief imports had to be scheduled to meet the needs of the millions of displaced persons that were expected to be uncovered. Com Z responsibilities for civilian relief were divided into two major parts - first, the territorial responsibility of the Commanding General, Com Z, and second, the operational supply responsibility for the civilian needs of all forward areas as estimated and requested by the armies who were to occupy these areas.

m. Toward the end of the winter, it was necessary to supplement the food supplies available in Europe by imports. A total importation of 630,000 tons of food were brought into northwest Europe between D-Day and the end of May 1945. Only about half of this was for France, a smaller amount for Belgium, Holland and Luxembourg, and the remainder was shipped forward to depots for displaced persons being uncovered in Germany.

148. Other Problems.

a. In addition to the problems outlined above, the armed forces, acting through their civil affairs organizations, were responsible for matters pertaining to local government - public safety, utilities and transportation, health, welfare, supervision of civil courts, local labor laws and fire protection. Prior to the establishment of the National Government in Paris, most of these problems had been supervised locally and only to the extent that the friendly relations with the French people made them necessary. As the French Government became more powerful, the problems diminished in importance, and the French became quite able to handle most of these matters themselves. In Belgium, the same general situation existed.

b. In France the US interest in legal matters was to reduce as far as possible black market activities such as black marketeers dealing with soldiers in gasoline, cigarettes and other items, and also displaying an interest in seeing that these civilians were brought to justice.

c. As rapidly as the control of the governments could be restored in France and Belgium, SHAEF turned over to those governments complete territorial responsibility and set up a SHAEF Mission for France and a similar Mission for Belgium, to act as its representatives on policy making matters with the national governments of those countries. The Com Z organization continued as the operating agency for supply as well as the performance of its other responsibility of making the Communications Zone safe and secure for the military operation.

d. The success of the accomplishment of the civilian aspect of the mission of the United States forces in northwest Europe can be measured only in results achieved. France, Belgium, Holland and Luxembourg had been occupied for four years by the enemy. The population of these countries had become accustomed to accepting the complete authority of the invaders. Most of their efforts had been directed to doing as little as possible tohelp the invaders. Suddenly the liberation of their countries arrived - they were without organization, and initiative had been thoroughly deadened. Moreover, a vicious collaboration with the enemy had permeated throughout a considerable proportion of the population. The Allied armies were thus confronted with the situation of not only carrying on the war against the enemy, but with the difficult problem of assisting helpless people who were torn by dissension and deadened by inertia to help themselves. This required patience, tact and understanding.

149. Receipts of Civil Affairs Supplies.

a. From the US during the period D-Day through the end of 1944, Civil Affairs supplies were brought to the Continent from the United States as partial cargo on ships carrying military supplies.* Total imports during this period amounted to 4,200 tons. After January 1945, Civil Affairs supplies were shipped in commodity-loaded Civil Affairs vessels within the monthly tonnage allocation. Total imports for the six months period, January to June 1945, amounted to 468,915 tons.

b. From the United Kingdom. From D-Day through October, 1944, Civil Affairs supplies were brought to the Continent by the supply services concerned within their own allocated lift. Total imports for this period from UK were 47,770 tons. After November, 1944, Civil Affairs supplies were sent to the Continent from UK within allocated monthly Civil Affairs tonnage lifts. Total tonnage for the period

* There was initially no separate ship tonnage allocation for Civil Affairs supplies.

November 1944 through June, 1945, was 151,860 tons.

c. Distribution to French Civilians. During the winter of 1944-45, distribution to French civilians alone included the following:

150,000	long tons coal
12,000	long tons food
100	3/4 ton trucks
15,000	pairs shoes
5,000	raincoats
5,000	long tons fertilizer
90	grain drills
180	ploughs
165	Long tons canned milk.

150. Organization.

a. Storage. Supplies stored by the services other than the Quartermaster, were comparatively minor in quantity and were stored in established depots with other army supplies. Even when the civil affairs supplies were segregated from army stocks there were losses, therefore in October, 1944, separate storage for Civil Affairs supplies was established in Paris and depots were also established at Verdun, Liege, Mons, Dijon and Nancy.

b. Division into Areas. Areas were established at Cherbourg, Paris, Verdun, Liege and Dijon and a Civil Affairs storage plan was adopted in order that supplies could be distributed to meet the requirements of France, Belgium, Luxembourg and the Netherlands. As the tactical situation developed, the Third and First US Armies drew the bulk of their Civil Affairs supplies from depots in the Verdun area, the Ninth and Fifteenth US Armies drew primarily from depots in the Liege Area, and the Sixth Army Group drew from depots in Dijon and Nancy.

c. Movement and Distribution of Supplies. In the early stages of the operations D-Day through November 1944, Civil Affairs supplies discharged by ships at ports were handled by the respective services. The supply services tended to favor other supplies of their own categories and only a few Civil Affairs supplies were moved. To alleviate this condition trucks intended for the French were retained and with French military operation personnel, truck companies were organized for hauling Civil Affairs supplies, thus overcoming a bottleneck in the receipt and distribution of necessary items.

d. Civil Affairs supplies were distributed in three general ways: first, Civil Affairs detachments took over control as territory was liberated, and requisitioned supplies for their area. Later, the National Governments became re-established and secured supplies in bulk for distribution through civilian channels. Still later, Com Z sections in the liberated countries and the armies in enemy territories collected supplies and distributed them to Allied displaced persons until they were repatriated or until their own government assumed responsibility for them.

e. To facilitate the turnover of Class I supplies at the ports a plan was set up and followed at the ports of Le Havre, Rouen, and Marseilles to make direct turnover from ships to agents of the French Government.

f. There were 8,938 motor vehicles allocated to Civil Affairs from the UK stocks and these were brought over monthly, the first two allocations being over Omaha Beach, the balance through Le Havre and Rouen. These were used by the French truck companies to haul Civil Affairs supplies. Arrangements were made in the UK that all vehicles

should be loaded with Civil Affairs supplies, such as spare parts, canned meat, clothing, etc.

g. POL supplies for Paris transported by rail amounted to 15,185 tons up to 28 December 1944 and by French truck companies, in 5-gallon jerricans, to 1 December to 3,060 tons. Deliveries of bulk POL to liberated countries from D-Day to 31 August 1945 was 667,000 tons.

151. Use of Captured Supplies for Civil Affairs.

a. On 19 October 1944 Com Z issued instructions to Base Section commanders permitting them to dispose of, through Civil Affairs channels, all captured items except those contained in lists of certain controlled items furnished by the supply services of Com Z. This means was first used as a source of these supplies necessary for issue to civilians, but later was utilized as a means of distributing large amounts of captured material. Accounting for these issued was arranged for by G-5, Com Z.

b. From D-Day to 31 October 1944, Base Sections submitted lists of captured supplies to G-4, Communications Zone, which circulated the lists among the Services and then offered the remaining items for Civil Affairs use. This procedure took so long that often supplies had been stolen or had deteriorated before they were made available for Civil Affairs use.

c. At Reims about 8 September 1944, ADSEC had the first real experience with captured enemy subsistence when approximately 2,500 tons of Class I supplies captured in the vicinity of Reims were issued to the POW camps at the rate of 150,000 rations per day.

152. Civil Affairs within Germany. The civilian problems of the armies in Germany were under the control of military government as distinguished from what had been known as "Civil Affairs". The field organization set up for the conduct of local Civil Affairs in the towns and cities of the liberated countries, when moved to Germany, were also charged in Germany with military government. Civil Affairs detachments became known as Military Government detachments. The approach to the problems in Germany was 100 per cent different from that in France, as the attitude of the personnel was one of firm, stern justice, rather than friendly cooperation.

153. Conclusion. The operation of Civil Affairs in the European Theater was the largest single effort toward rehabilitation of a friendly country made by the Allied forces in any one area throughout the war. Generally, it may be considered stupendous success in that it materially aided four nations to eventually become active Allies in the common effort.

154. Recommendations. The following recommendations for the improved handling of Civil Affairs supplies are quoted from an authoritative Civil Affairs source, and it is suggested that before a similar operation be undertaken again, study be given to the following points:

a. Either the establishment of a separate or parallel Civil Affairs supply service such as Quartermaster, which would permit:

(1) More accurate accounting.

(2) Complete regulation of stocks.

(3) Handling by specialists of special items such as farm machinery.

(4) The formation of an organization prepared to meet sudden emergencies.

(5) Determination of priorities at the General Staff level.

b. Or by placing the responsibility squarely on the services, which would involve:

(1) Using the same standard of accountability for Civil Affairs as for other items.

(2) Determination of requirements as much in advance for Civil Affairs items as for other items.

(3) Prescribing a basis for issue which the services could apply as objectively as they apply standards for other issues.

(4) Less flexibility to meet emergency demands.

c. Packing and Marking. That because Civil Affairs items are subjected to the same field conditions as other army supplies, similar packing and marking standards be applied.

d. Priority. Establishing some tangible basis for determining priority to be accorded civil affairs supplies. When not needed, they are normally given the lowest priority with the result that when an urgent need arises, not even the highest priority will assure delivery when needed.

CHAPTER 17

CAPTURED ENEMY MATERIAL

155. General. No study of the logistical support of a campaign would be complete without a brief consideration of the supplies and equipment which the enemy was forced to abandon during the retreat of his force. These materials augmented our supplies, and at the same time created major disposal problems. The greater portion of the captured enemy material was disposed of by the Ground Forces. Portions were utilized by the armies, portions were destroyed, and the balance was turned over to the Communications Zone and Civil Affairs for eventual disposal. In general, it was the policy to allow the Ground Forces to decide the extent to which the captured stocks would be utilized by them and what should revert to Civil Affairs and the Communications Zone.

156. Food Stores Captured. Class I. As the armies advanced thru France, Class I ration dumps were taken, many of these being in underground storage and therefore well preserved except for those portions which were destroyed by the curiosity of our forces when encountering unknown containers, and by looting by the liberated populace before adequate security measures could be instituted. Insofar as possible, the attempt was made to utilize these supplies to the fullest extent for the feeding of the prisoners of war in the various inclosures, and some of these supplies were also released to Civil Affairs for use in the displaced persons' camps. They aided in reducing the division of our own Class I supplies for such purposes.

157. Utilization.

a. Class II and IV. The Class II and IV supplies constituted the greater bulk of the captured enemy material, and both effectively augmented our stocks and created the second largest disposal problem (the first was Class V Ammunition). While the armored spearheads were racing through the occupied countries, the follow-up infantry increased their motorization, in an attempt to closely follow the armor, by utilizing all the serviceable vehicles captured from the enemy, and after serving their purpose periodically these vehicles were disposed of. The vehicles of United States or British manufacture were used to augment both field force and service force organic transport. Some of the vehicles which required only first and second echelon maintenance were assigned to Communications Zone troops and to prisoner of war enclosures and displaced persons' camps. The balance of the vehicles other than combat vehicles, were generally placed at the disposal of Civil Affairs for release to the liberated areas to rehabilitate their badly depleted transport. Later when advancing through Germany the unserviceable vehicles and many types of combat vehicles were destroyed to prevent their use by hostilely-passed resistance groups.

b. During the campaign in the occupied countries the captured weapons, including artillery, were utilized to arm authorized resistance groups in those countries and to provide security arms for prisoner of war enclosures and local prisoner of war stockades. Later, when advancing through Germany proper, those arms not definitely required for a given commitment were destroyed.

c. Considerable quantities of construction supplies, such as cement, hardware, asphalt, tar, lumber, etc., were captured which materially augmented our own similar supplies. These items were stocked in the depots, and issued with little or no differentiation between US or captured origin.

d. Quantities of enemy machine tools and equipment were taken in the occupied countries and in Germany. These machines and tools were utilized to augment organic equipment of military organizations and to provide equipment for plants which were used to manufacture products for the military forces. When the machine tools which were captured in liberated territories were identified as manufactured by, or being the former property of, nationals of liberated countries, these items were returned to their original owners or made available to the governments of those liberated countries if the items were not required for the military forces.

e. The Signal Corps was able to utilize the telephone and telegraph cables and equipment and trunk lines which the Germans were forced to abandon. Much of the radio communication equipment was of such a nature that it was not utilized to any appreciable degree until after hostilities had ceased.

f. Many other supplies such as clothing, leather, blankets, paper, textiles, and mess equipment were also utilized. The clothing, blankets, textiles and mess equipment were especially valuable in caring for the prisoners of war and displaced persons.

g. Class V. In the early stages of the campaign, the Class V stores of ammunition did not present the problems which were encountered after entering the final stages of the progress through Germany. Insofar as possible, the Class V was concentrated in a few dumps where certain types were made available to recognized resistance groups in liberated countries, some 75 mm projectiles were converted for the United States Forces, and the balance usually reverted to military forces of the liberated countries to guard. After our forces advanced into Germany and Austria, it was necessary to destroy the small quantities and segregate the large quantities in central areas where it was found necessary to provide United States personnel for the security of the dumps.

h. The CWS Class V was, and still is, a major problem. The Ordnance Class V could be disposed of by detonating in small quantities, but the toxic gases must be carefully guarded until they are neutralized or dropped at sea.

158. Conclusions.

a. Captured enemy material and installations can effectively augment the normal supply sources if proper supervision is exercised. Unfortunately much enemy material and many facilities which could have been effectively utilized to support the allied forces and to rehabilitate the liberated countries were damaged and destroyed by both ignorance and wanton maliciousness.

b. A definite positive policy should be established whereby captured major supply dumps and major industrial installations would be placed under guard until technically qualified personnel render a decision on the proper disposition.

c. There was no provision made in advance for personnel for the proper identification and supervision of stocks of captured enemy materiel, and this resulted in the ineffective use of much valuable stocks, particularly Class II clothing, blankets and other similar equipment.

CHAPTER 18

SUPPLY OF SOLID FUELS ON THE CONTINENT

159. Preparations and Plans.

a. The supply of coal to the Continent in the quantities required by military agencies and civilians after the Allied Forces landed in France was a problem of major proportions for the US supply agencies. History did not offer a guide, and textbooks and manuals were of no help in meeting the coal situation. The pr blem was simplified greatly because Great Britain had always exported large quantities of coal in peacetime, and their facilities for mining and distribution had suffered relatively little war damage. To assist in production, open-cast mining machinery was ordered from the US and shipped to Great Britain. This machinery was used to excellent advantage to increase coal production for export to the Continent.

b. Movement of coal from Great Britain was to be programmed by the Transportation Corps so that it could be received with other military stores at Continental Ports. It was planned that Granville should be used entirely as a coal reception port. The other small Brittany ports of St. Malo, St. Brieuc and Morlaix were considered, but each required small colliers. Assignment of the small colliers (300 to 600 tons capacity) could be provided only by diverting them from the stores program, which was undesirable. Cherbourg could not be regarded as a permanent coal port, but could be used temporarily until the Brittany ports were developed.

c. Shipping was to scarce and the need on the Continent was so critical that sending other than the best grade of coal to the Continent could not be risked. Although a shortage of coal of suitable grade for rialway operations existed in Great Britain, it was felt that the British railways could be operated with a lower grade of coal than could be utilized on the Continent under the conditions prevailing there.

d. It was agreed that coal would be regarded as a common-user item and would not be consiged to either British or US Forces, but would be sent to the ports as the coal could be received and there allocated. Coal which was requisitioned to be delivered only in 80-lb bags amounted to 6,230 tons for the period D-Day to D plus 41. The deliveries were to Omaha Beach, Utah Beach and Cherbourg.

160. Coal Ports on the Continent. Caen was the principal coal port for the British sector; the small Brittany ports were given high priority for naval clearance for the import of coal into the American sector. Investigation of the ports revealed that Cherbourg had two berths available for ships of 16 ft draft; and one berth for 20 ft draft; St Brieuc had a maximum draft limitation of 11 ft; Granville could be cleared for 15 ft draft and would be available for use approximately on 10 September; the draft limitation for Caen was 16 ft and would be available for use on 4 September. A rail line from Granville to Versailles was ready for operation on 7 September.

161. Distribution.

a. The first deliveries of coal on the Continent were made into Cherbourg on 26 July. When Cherbourg was prepared to receive coal in quantity on 26 August, immediate requirements were set at 2,500 tons per day through that port, with 4,000 tons per day through Caen. Any additional coal required would have to be shipped through the ports of Granville, Morlaix, St. Brieuc, or St. Malo.

b. A flow of coal was established without waiting for the rail lines out of Cherbourg to be completed. To provide for this, a dump which could receive 10,000 tons was cleared at the 16 ft draft berths, and 35,000 tons at the 20 ft berth. The collier fleet to meet US requirements was established at 27 ships of 10 ft draft for the port of St. Brieuc; 16 ships of 15 ft draft for Granville, and 15 ships of 16 ft draft for Cherbourg. St. Brieuc was opened for coal on 19 September, and until it was closed on 26 October, 10,175 tons of coal were discharged.

c. The first collier arrived in Granville on 29 September. A target of 2,000 tons per day was established for that port. Up to 13 October the coal imported through Granville had been received in the outer harbor. On that date rehabilitation of the inner harbor berths was completed and they were ready to receive colliers. Unloading was handled by equipment which had been procured in England. Granville had nine berths, all rail served.

d. Plans were completed early in October to prepare Rouen to receive coal, and the first collier arrived there on 1 November.

e. The urgent need for providing some coal for French civilians in the Brittany Peninsula became evident in December. It was decided that coal would thus be imported through Morlaix or St. Malo. Morlaix already had been developed to handle supplies (though abandoned for such purpose on 14 December) as it became a coal port, and the first collier arrived on 7 January 1945.

f. The British discharged 25,470 tons of coal at Caen, of which 21,560 tons of locomotive coal was transferred to US forces during October and November.

g. To assist in moving coal to the Continent, railroad cars shipped there were partially loaded in UK.

162. Needs of Public Utilities. The US forces soon were faced with the problem of keeping the essential French public utility services in operation. The first coal to be imported into Cherbourg was used in operating the local electric and gas works. Then, as sections of Normandy and Brittany were liberated, coal was moved to power plants there, the principal ones being at St. Brieuc and Rennes.

a. Studies were made of the best means to keep the Paris utilities in operation. French officials reported that electric installations would require 3,000 tons of coal per day. This would allow only the minimum service on the Metro subway system. The 3,000 tons per day represented less than one-quarter of the pre-war requirements for electricity in Paris. As the production of the coalfields still was questionable, plans were made to supplement the coal stocks of approximately 25,000 tons that were available in Paris when the city was liberated. This coal stock was sufficient to keep the utilities operating until approximately 14 September. Arrangements were completed with the British War Office to bag 1,500 tons of coal, to be imported into the British Zone and transported to Paris as soon as rail lines were available. This expedient was necessary because the import capabilities at Cherbourg already were being utilized to the maximum. The French national rationing authorities estimated that the Paris area must have three hours of electricity per day and one and a half hours of gas, as the absolute distress minimu. The requirements of the French National Railways in Paris amounted to 500 tons per day, which was soon increased to 700 tons per day as traffic was resumed and increased.

b. To supplement the coal supply, action was initiated to produce all the peat possible in those fields which had been uncovered, and to utilize wood as a substitute fuel wherever possible.

c. On 14 September coal began to arrive in Paris from French mines which had been uncovered by the Third Army. A reconnaissance disclosed 117 trains of coal halted in the Paris area, and action was taken to repair rail lines and bridges so that the coal could be delivered.

d. As canals could not be repaired quickly the coal that was loaded in barges north of Paris was moved to St. Quentin, where it was transferred into rail wagons. This work started on 14 September. Until the canals could be opened to make deliveries to Paris by 14 October, all coal had to be moved by train. Power lines were repaired to the Pas de Calais-Nord mines so that electricity could be brought into Paris to relieve the shortage of coal.

163. Sources of Coal for Troops. To supply troops in France with coal during the fall of 1944 it was decided that those US Forces east of the zero meridian and north of the Loire River to the Basle (Switzerland) line would receive coal from the Pas de Calais-Nord mines. The actual shipment of coal was carried out by the French railways without the use of military transportation, and delivery was made to destinations indicated by the Chief Quartermaster, Gen Z. Coal for troops in Normandy and Brittany, north of the Loire River and west of the zero meridian, was supplied by imports from the UK. US troops in southern France were furnished coal from southern French mines and by imports through Marseilles. Coal for troops located in Belgium, Holland and Luxembourg was supplied from mines in Belgium and Holland. Where possible, coal was procured locally by units from certain designated mines, to eliminate rail transportation. Where this was not possible, the Belgian national railways delivered the coal in Belgium and Luxembourg. The first shipment of coal from the Pas de Calais-Nord mines to US Army troops was made on 14 October.

164. Increasing French Mine Production. When the French mines were liberated in September (the mines in the Lille district reopened on 19 September) they operated on a three days per week schedule which provided sufficient coal to maintain the mines and supply coal for the coke ovens which furnished gas for the operation of the mine pumps. By this time army requirements for locomotive coal were 6,000 tons per day. Normally, 10% of the French coal production was suitable for locomotive use. To meet the army requirements the pits producing locomotive coal were jumped to a six days per week schedule. The production of the mines of northern France reached 225,000 tons for the last week of October. Early in November it was decided to operate all the mines on a six days per week basis, effective 20 November 1944.

165. The Locomotive Coal Situation in southern France became critical in November as the stocks were used up. To relieve this situation locomotive coal was imported from the UK into Marseilles and repairs to the Tarascon-Beaucaire Bridge were so rushed that coal could be removed across the Rhone River from the St. Etienne coal fields. The production in southern French mines increased from 52% of normal during October, to 69% of normal during November, 1944, during which time all mines were operating six days a week on a single shift. To increase coal production further, the French employed prisoners of war in the southern French mines with very satisfactory results.

166. Patent Fuels. Much coal dust accumulated at the mines throughout France. To utilize this it was decided to manufacture patent fuels (briquettes and ovoids), which required pitch imported from

the UK. Shipments soon were started into the port of Sete, in Southern France. From that port the pitch was distributed to the mines manufacturing patent fuels.

167. Coordination with National Governments. The need for increased tonnage of solid fuels for operation of Allied ports, running the military railroads and essential utilities, and for troops use, was very apparent. This requirement had risen to 307,000 tons for October and 322,000 tons for November, 1944. This tonnage could not be imported from the UK. An agreement was reached with the National authorities of France, Belgium, and Holland to place demands for solid fuels on each country.

168. SHAEF Organized a Solid Fuel Staff sub-section for each country, and after receiving total requirements from all military agencies, submitted these requirements to the appropriate country sub-sections for allocations. The national sub-sections formed "Working Parties" composed of US/British military personnel and officials of the national government concerned. The sub-section would submit the essential civilian requirements. The total requirements were screened, taking into consideration the production of indigenous mines and the quantity of agreed imports from the UK. Agreements then were reached as to the tonnage to be allocated for military purposes and that which was to be allocated for essential civilian use. The approved military tonnage allocations were then submitted by SHAEF to the appropriate military authorities for distribution. All solid fuels imported from the UK were requisitioned by SHAEF and distributed either to the national governments (through military agencies) or to the military, according to allocations made by SHAEF.

169. Supply of Minimum Essential Needs. The combined imports and production in liberated countries were not sufficient to meet the minimum essential civilian and military requirements during the winter of 1944-45. Allocations made by SHAEF were only 65% to 70% of the requirement submitted by the US forces, who rarely received more than 50% of their total requirements. This reduction meant that all units had to adhere to strict economy in the issue of solid fuels, and only the barest amount was issued. (No heat was furnished for troops, and hot water only once each week.) This shortage of solid fuels also affected the civilian population. At one time, in January 1945, the Paris electric plant had only a 5-day supply of fuel, and to relieve this situation, a number of locomotives were placed at the disposal of the French for a period of 60 days. At other times purely military coal was turned over to the French so that certain essential utilities could be kept in operation. Close liaison was always maintained with the French authorities to see that essential utilities remained in operation.

170. Vital Mine Prop Program.

a. The military authorities realized early during the liberation that solid fuel production was paramount in conducting the war against Germany. All aid possible was given to the National authorities for increased production from indigenous sources. One critical item affecting production was the supply of mine timber to the mines of France. By early October 1944, French mines had only approximately one week's supply of mine timber, and would be forced to stop production unless this supply was immediately augmented.

b. It was necessary to arrange for a supply of mine timber and a target of a two months stockpile by January 1945 was set. To meet this responsibility close liaison was established with French regional authorities, and repairs were made to rail facilities and

bridges essential for delivery of the product. By 25 December 1944 the stock of mine timber had increased from 15,000 tons to more than 140,000 tons, or approximately two-and-a-half months supply.

171. Procuring and delivering critical mine supplies was very essential and in order to carry out this responsibility OPA procured the supplies either from local sources or by purchases from the UK or US. Priority I on movement of these supplies was established. This program moved slowly at first, because of the technical details involved, but more rapidly as the program got under way. The French were assured that all supplies requisitioned under this program prior to 30 June 1945, and loaded not later than August, would be delivered by the military.

172. Coal Discharge on the Continent D-Day through VE-Day.

June 1944	.....	2,035 tons
July	.....	4,195 "
August	.....	7,890 "
September	.....	37,520 "
October	.....	61,550 "
November	.....	83,375 "
December	.....	102,495 "
January 1945	.....	161,195 "
February	.....	197,975 "
March	.....	260,550 "
April	.....	208,655 "
1-8 May	.....	40,975 "
	Total	1,168,410 tons

CHAPTER 19

SUPPLY BY AIR

173. a. Definition. Supply by air is defined by Field Service Regulations (FM 31-40) as the transportation of supplies by cargo aircraft or gliders from a rear base to a forward landing area or over a forward area on which supplies are dropped from the planes to the ground by parachute.

b. Emergency supply by air (SHAEF Operational Memo #29) was defined as the employment of aircraft to meet emergency demands for the carriage of supplies or replacements from an Air Base, base depot or rear area to any part of the operational theater. Emergency air supply was authorized only under the following conditions:

(1) As a priority task to meet the need for urgent movement of particular supplies when other means of transportation were not immediately available, or were impracticable under the conditions prevailing.

(2) For the maintenance of a fighting unit in the field when, for operational reasons, the normal means of maintenance were considered too slow, were broken down, or were interrupted by the enemy.

(3) For the movement of the air echelons of Air Force Units, ground staffs, and military replacements.

c. The use of aircraft for supply by air was initially limited by the availability of airfields, the degree of air superiority, the availability of supply dropping equipment and aircraft, and the weather conditions.

174. Air Movements for Supplies.

a. Emergency Supplies. Air lift of emergency supplies was actually initiated on D + 6 and was used continuously by all armies during the entire campaign. On 16 August Third US Army made a request for an emergency air lift of 1,500 tons daily, as it was advancing rapidly and Signal, Ordnance, Medical and POL supplies were urgently needed. The emergency Air Lift was suspended to all armies on 20 August 1944 to allow for air shipment of 3,000 tons of civil affairs supplies to be flown to Paris for emergency relief. In September, 1944, the First US Army requested the air shipment by 1 October 1944 of approximately 3,000 tons of initial issue of winter clothing. Twelfth Army Group considered that the request would be followed by similar requests for other items for winter operations by other armies, and prepared accordingly.

b. Critical items usually called for in emergency air lift were:

CWS testing equipment for flame throwers.
Engineer maps and photographic supplies.
Medical hospital equipment and supplies.
Ordnance repair parts.
Quartermaster repair parts.
POL.
Signal Radio tubes and parts.

c. The first air shipment of gasoline into the Third US Army

area in support of the advance into Germany arrived on 30 March 1945. From that date until 9 May 1945, 22% (6,046,530 gallons) of all gasoline used by the Third US Army had been delivered by air. From 3 April to 3 May 1945, 11% (1,571,870 rations) of all rations issued by Third US Army were brought in by air.

d. As the advance drove deeper into Germany certain items of Class II and IV supplies became critically short in forward areas, such as signal wire, dry cell batteries, ordnance bogie wheels, tires for motor vehicles and medical blankets, litters and drugs and many of these most critical items were flown in by air.

e. Critical Medical Items. To facilitate the supply of critical medical items by air, ETOUSA published SOP 21 in June, 1944. Some medical items required rapid delivery to the continent because of their nature. These included whole blood, blood plasma, sulfanilamide drugs, biologicals, and penicillin. In addition, litters, blankets and splints were required in exchange when evacuating patients on the flights to the rear. Empty whole blood shipping containers and used blood recipient sets required return air transport for refilling.

f. Whole Blood Plasma by Air. Long before D-Day, it was realized that whole blood for battle casualties would be needed on short notice and in large amounts. Five thousand pints were ready by D-Day, and from 500 to 1,500 pints per day were supplied thereafter, depending on requirements. A blood bank truck loaded with the assault forces. Four motored Douglas Skymasters flew chemically preserved blood direct from the United States at the rate of 1,000 pints daily. In some instances blood donated in the United States on Monday was flowing in the veins of a wounded man in the ETO on Friday and thus saving his life. Too much cannot be said in tribute to the hundreds of thousand of blood donors in the United States, who, whole-heartedly donated their blood to save the lives of husbands, fathers, sons, and sweethearts. Whole blood was sent to isolated units under an escort of Sherman Tanks, was fired in artillery shells, and was dropped by parachute, to units cut off by the enemy. Every day 2½-ton trucks carried their cargo of whole blood to front line field and evacuation hospitals.

175. Air Lift of Troops for Combat Missions.

a. In addition to movement of supplies by air, the aircraft of the Ninth Troop Carrier Command carried 47,745 troops and their equipment on combat missions and 64,360 troops on training missions from 17 September to 10 November 1944.

b. Another task undertaken by the transport forces during the emergency of the Ardennes offensive was the movement of reinforcement troops from the UK and from Marseilles to the reinforcement pool in the Reims area. The entire SHAEF reserve was committed to fill the gap in the Allied line created by the enemy's sudden and rapid advance. The 17th Airborne Division, which had been in the UK, was flown from the UK to the Reims area between 23 and 29 December to form the nucleus of the new SHAEF reserve. No less than 1,110 sorties were flown in the performance of this task.

176. Emergency Supply to Isolated Units.

a. On 8 June 1944 (D + 2) 15 pounds of Ether were dropped to a field hospital between Normandy Beach and Carentan. On 22 June 1944, supplies of food and water were dropped to an anti-aircraft battery marooned on St. Marcouf Island, off shore from Utah Beach. During the

battle in the Avranche-Mortain area, an isolated battalion received 24 aircraft loads of supplies by parachute consisting mainly of food, ammunition and medical supplies.

b. A battalion of the 36th Division, Seventh US Army, became isolated in the area of Foret de Champ in the Vosges Mountains on 26 October 1944. On 27, 28, and 29 October, ammunition, medical supplies, rations and signal batteries were delivered to this isolated unit. P-47 fighter aircraft were used for this delivery. External fuel-ferrying tanks (belly tanks) were used for dropping the rations.

c. On the first day of the Ardennes break-through by the enemy, a portion of the 106th Infantry Division and a battalion task force of the Third Armored Division were cut off in the area south of St. Vith and were supplied by air on 16 December 1944.

d. On 21 December 1944 supplies were dropped to the 101st Airborne Division in the Bastogne area and the following was accomplished:

23 December	251 planes	
24 December	160 planes	
25 December	0 planes	
26 December	289 planes	10 gliders
27 December	130 planes	32 gliders
Total	830 planes	42 gliders

e. Numerous other instances occurred whereby the dropping by parachute of emergency supplies was accomplished with success and likewise a few instances where the dropped supplies did not land in the target area and were lost to the troops for whom they were intended. However, as is shown in the Bastogne relief mission above, air lift is an extremely vital necessity to the armies in combat.

177. Air Evacuation.

a. Early in August, 1944, the Twelfth Army Group made comprehensive arrangements with the Ninth Air Force for the air evacuation of up to 500 patients per day. However, medical evacuation by air had already started on D + 6 from the relatively small and congested logement area on Cotentin Peninsula and for the week ending 12 June 1944, 122 patients were evacuated to the UK by air. Patients evacuated by months throughout the campaign were as follows:

June, 1944	5,370
July	22,570
August	21,475
September	12,330
October	10,155
November	5,810
December	13,515
January, 1945	5,380
February	5,730
March	28,715
April	35,405
May 1-8	6,005
Total	172,460

b. By the end of April 1945, more than 100,000 repatriates had been flown out from forward area by the transport forces. From 5 April to 9 May 1945 planes returning westward from supply missions carried allied prisoners of war at an average daily rate of 3,015. (Appendix 14).

178. Use of Heavy Bombers Uneconomical. During the rapid advance through France in the summer of 1944, a considerable amount of air lift not only by troop carrier forces but also by special forces of heavy bombers, which were set aside for the task, was involved in the carrying of gasoline, food, ammunition and other essential supplies to the rapidly advancing spearheads of the Armies' progress, the immediate need for this type air lift had dwindled. Experience had proven that the hauling of POL by heavy bombers was uneconomical, therefore the supply of POL by bombers to ground forces reverted to normal supply channels, and air lift thereafter was limited to the carrying forward of items of limited essential, high priority requirements, including medical supplies, blood plasma, special signal equipment, currency, mail, ammunition, rations and a great variety of other commodities. This program was carried out exclusively by troop carrier forces.

179. Total Tonnage Handled by Air Lift During the Campaign was:

Month	Tonnage
June, 1944	2,595
July	4,025
August	8,240
September	28,540
October	27,400
November	17,005
December	5,570
January, 1945	860
February	2,240
March	4,370
April	45,825
May 1-8	3,775
Total	151,245

180. Teamwork. In the rapid advance of the Armies there were times when the smooth unloading of cargo planes by Com Z and the armies was not capable of being accomplished, due to lack of manpower, interrupted schedules, or other unforeseen conditions. In some instances, for example, on 5 and 6 September, when ground operations were moving very rapidly, new landing fields being established without adequate advance notice, and when communications were inadequate and unreliable, the pilots and crews of the C-47's often unloaded their own planes. The cheerful way in which these air crews assisted in the emergency provided adequate evidence of the excellent teamwork between the Air Forces and the Ground crews during the campaign.

181. Conclusions.

a. To adequately maintain supply by air, there must be:

(1) Air superiority.

(2) Visibility.

(3) Air fields.

(4) Proper type plane for the mission.

(5) As few agencies or headquarters as possible to expedite delivery.

(6) Only one regulating agency.

b. An SOP for "Supply by Air" should be compiled for all type of operations, also the use of gliders should be exploited.

c. Supply agencies should not use air fields for storage unless abandoned by the air force.

d. Consideration should be given to a "Tanker type" aircraft for the emergency movement of bulk POL which would require the necessary handling equipment at both origin and destination.

e. To realize the greatest value from air lift, maximum pay loads should always be carried if at all possible, emergency supplies in, personnel out.

CHAPTER 20

INLAND WATERWAYS

182. Organization and Planning.

a. In the preliminary planning of operations for the Continent, no provision was made to use Continental inland waterways for the movement of military supplies. It was believed that the waterways would be so badly damaged by bombing and demolition that they could not be put into operation in time to be of any material value.

b. In September 1944, a study was made of means of getting coal to Paris and it was found that the waterways system from the northern coal regions in the Douai area would have to be opened if a sufficient supply of coal was to reach the Paris area. With the opening of this waterway in mind, the Commanding General, Com Z, established the Com Z Inland Waterways Committee. This Committee was charged with the responsibility of evaluating all inland waterways reconnaissance, acting as the U. S. agent to deal with the French agencies concerning these matters, recommending the priority for opening the inland waterways, and starting the work load involved and the equipment and supplies needed.

c. The Committee gave first priority to the opening of the Oise River system for the transport of coal by barge from the Douai area. The next priority was given to assisting the French in opening the Seine River with a view to using it for civilian traffic only. However, with the opening of the Seine it was soon that inland waterways could be used to greater advantage than anticipated, by the army in transporting military supplies. With this use in mind, the Inland Waterways Division, OCOT, was activated 7 November 1944.

183. Obstacles to be Overcome.

a. The heavy rains during the autumn and winter of 1944-45 and the consequent flooding caused so much more damage to highways and bridges than for a normal year, that problems of maintenance and protection mounted. Many of the most important highways and bridge building projects of France had been planned on the basis of maximum flood levels for the period since 1905, but on many of the streams of France the water levels were higher in 1944 than they had ever been in the whole forty years' period intervening.

b. Floods also affected the inland waterways systems of France and Belgium, which had to be reopened for the movement of coal for the Army and civilian needs. Four important systems were cleared. On the Liege-Paris route, the Meuse River was made navigable again from Liege to Pont-a-Bar; the Ardennes Canal and Aisne River were opened from Pont-a-Bar to Compiegne; the Oise Canal from Compiegne into Conflans; and the Seine from Conflans to Paris. The clearance work included the removal of the debris of demolished bridges over rivers and canals, repairs to damaged locks and the removal of sunken ships and obstacles.

184. Belgian Canal System.

a. The capture of the port of Antwerp and the possibility of its early use brought about the project of opening the Albert Canal, which extends from Antwerp to Liege. This canal was blocked to navigation, and out of approximately 100 permanent bridges along its course, only one did not present a navigational obstruction. An Engineer Group was assigned to the project of making navigation possible in the U.S. area, first to 600 ton barges and later to 2000 ton barges. The target date on the first project was 15 December 1944.

b. The nature of the demolitions of the bridges was such that divers, heavy rigging and heavy equipment were required for their removal. Rehabilitation of the Albert Canal also required extensive repairs to one major lock at each of three locations where there were groups of three parallel locks.

185. Operations.

a. During the initial period of barge canal renovation, tentative unloading sites were selected. These sites were chosen in every case to afford the minimum haul from barges to the receiving depot. Responsibility for discharging barges and transferring supplies from the barges to truck and rail was given to the Transportation Corps.

b. Throughout the first 15 days of December, operations on the waterways of Belgium and France were hampered by flood conditions. This delayed, in some instances, rehabilitation target dates which were already set back by operating problems. The first barges were dispatched to Liege from Antwerp loaded with Engineer supplies on the 19 December, consigned for delivery points via the Charleroi, Sambre and Meuse Rivers. These barges were to deliver their loads to Liege, but did not reach this point until the first of February due to the many operating problems met, such as flood conditions on the rivers, delay in removing bridge obstruction, the German breakthrough in the Ardennes, ice jams on the rivers and floating bridges being used during the tactical emergency. Additional barges were dispatched via Boom and via the Albert Canal after 15 December, the first of which arrived in Liege on 26 December.

c. Discharging operations would have proceeded according to schedules and all other barge operations at this time might have met all targets set on tonnages, but the German counter-offensive in the Ardennes altered completely the supply situation and barge operations were affected until late December.

d. On the Albert Canal, between Antwerp and Liege, the demolition technique of the Germans had been thoroughly applied. In the section of the canal between Kwaademechelen and Liege, which had been assigned to the American forces, 21 highway and railroad bridges had been wrecked to block the waterway. The enemy had also blown up all locks and footbridges.

e. The rehabilitation work, which began in October 1944, was planned in two phases. The first objective was clearance for 600 ton barges, and the second clearance for 2000 ton barges.

f. During the early stages of the Albert Canal operation, the canal had been emptied, but it was necessary to begin refilling in soon after clearance was obtained in order to have it ready for use by 15 December. Both the first and second phases of the whole work were performed on schedule, and on 15 January 1945, the great waterway was open for heavy traffic, including the 2000-ton barges.

g. The Antwerp-Liege system, including the Albert Canal, was cleared as far as Kwaademechelen by Belgian civilian workers aided by British troops from Antwerp. From Kwaademechelen to Liege, U.S. Army Advance Section Engineers, assisted by civilian labor, cleared the rest of the canal.

186. Movement.

a. The first few barges moved took the route Brussels, Charleroi and Namur into Liege, since the Albert Canal, which was the more direct route, was not open for operation until 24 December. Supplies started to

move from the port of Ghent via barge to depot areas in Belgium and northern France on 26 January. With the movement of supplies by barge from ports to depot areas it became necessary to establish the following inland ports: Brussels, Liege, Lille, Reims, and Paris. All these ports, with the exception of Brussels and Paris, were operated by Transportation Corps Port Companies. The Port of Brussels was operated by a British port company and the Port of Paris by civilian labor under the supervision of the Inland Waterways Division.

b. Inland waterways had been rehabilitated to a considerable extent, particularly the important Belgian Canals serving Antwerp, Charleroi and Liege. Because of the German Ardennes offensive and the security restrictions placed on the Meuse River, followed by unusually severe weather, only limited tonnages of supplies were being received in the Charleroi-Liege area by barge up to the beginning of this period. The tonnage increased rapidly in March, and the first barges arrived at Liege via the Charleroi Canal, Sambre and Meuse Rivers during the first week of that month. The large locks of the Albert Canal were opened to navigation on the 13th of March permitting the use of 2000 ton barges from Antwerp to Liege. The first barges to pass through were barges of QM Class I, which arrived at Liege about 15 March. During March, 54000 tons were handled, consisting of Engineer Class II and IV, 35830 tons; QM Class I, 8,990 tons; QM Class III, 1760 tons and miscellaneous, 7380 tons.

c. The use of the highly developed Belgian inland waterways system was of great importance in relieving congestion, not only in the port of Antwerp, but in the entire Charleroi-Liege maintenance area. In addition to handling sizeable quantities of military supplies, the waterways relieved the hard-pressed railroads of transporting very large tonnages of critically needed civilian food and fuel.

d. Barge operations were halted during the German break-through and in mid-January the Meuse closed to traffic because of the freezing of the locks and critical high-water stages. Due to this condition, barges loaded almost entirely with Engineer II and IV supplies were held up at various locations. For the month of January, 40 barges were dispatched from Antwerp and for the same period 5,950 tons were discharged at Liege. The Meuse River thawed on the 1st of February, but navigation was still impossible due to the flood stage. By the 22nd of February, the backlog of barges, which had built up since the opening of the Port of Antwerp, was decreased to the extent of having no barges at Liege awaiting discharge and with only 7305 tons en route to the depot. The total discharged at Engineer Dump E-514 for the month of February was 23,525 tons.

187. Seine River System.

a. On the Le Havre-Paris waterways, the Seine was cleared to ocean-going vessels as far as Rouen. From Rouen to Paris, the chief obstacle was the Le Manoir railroad bridge, before which many loaded barges were backed up during the flood. The first 24 loaded barges came through on 22 November and 68 empties passed the bridge going toward Rouen. By 27 November, the flood waters had made it necessary to unload Paris-bound barges at Les Mureaus, as it was impossible to bring them nearer to the city. Barge shipments began on 6 November 1945, and in that month accounted for an average of only 268 tons per day. December tripled that average, and thereafter barge tonnage grew steadily despite the handicap of floods on the Seine and heavy ice on the northern canals, which were kept open by sea mules working as ice breakers.

b. Because of the floods and the freezing of the canals, coal for Paris was brought in throughout December chiefly by rail.

c. By January 1945, the rivers were nearly cleared and barge traffic was operating on a regular basis of about 12,500 tons of coal daily for Paris by river and canal. However, even when the floods were no longer a menace, the enforced necessity of using a single tug to pull an average of five barges made river operations far less efficient than they had been under the pre-war system of self-propelled barges.

188. a. The peak movement of canal traffic was reached in April. The following figures show tonnages moved forward from rear areas by barge during the period of their operation:

Month	Total	Supplies Tons/Day	Bulk POL Total	Bulk POL Tons/Day
November	8020	265		
December	24870	800		
January	77845	2510		
February	97995	3500		
March	131390	4210		
April	190270	6340	75640	2520
May	153265	5135	75570	2340

b. After movement was started in November there were five days in that month when no barge tonnage was moved. December had six such days, and four others during each of which less than 200 tons were moved. January had one day of zero movement and two days with less than 200 tons each.

189. Rhine and Main River System.

a. It was early recognized that reopening the Rhine and Main Rivers to navigation was by far the most important part of rehabilitating navigable waterways in Germany. The use of the Rhine River for the movement of supplies, particularly coal, was second only to the rehabilitation of the railroads. The Inland Waterways Branch of the Transportation Section, ADSEC, was, therefore, fully occupied with this problem as soon as the banks of the river had been cleared to permit surveys and reconnaissance.

b. The reconnaissance of the Rhine River in the U.S. Sector from Koblenz to Karlsruhe was completed and units were moved to the site to remove the obstructions in this sector through which channels could be provided. The river is, at the time of this report, being swept between these major obstructions and there may be more sunken barges to be removed than the three reported. German contractors, their equipment, and any available local floating equipment are being used to the greatest extent possible by the Engineers.

c. Reconnaissance of the Main River and Ludwigs Canal from Mainz to Kleheim has been initiated but is not completed; however, the clearance of the Main River from its confluence with the Rhine River at Mainz to Frankfurt (to include Marine Terminals only) is under way and is included in the existent Rhine River project. The bridge structures over the Main River are not nearly as massive as those over the Rhine, nor is the current velocity nearly as great, and it is not believed that this portion of the project will offer any difficulties.

d. In April 1945, the Rhine Branch of the Inland Waterways Division was established to facilitate clearing the Rhine for operating at the earliest possible date. While it was not planned to transport military supplies on this waterway, the Rhine is an integral part of the German economic system. Therefore, it was necessary to have this river operational to move civilian supplies and coal into the occupied zones of Germany.

190. Cooperation with Liberated Countries. Many obstacles were encountered in the opening of the waterways, such as lack of supplies for reconstruction work, lack of tugs and machinery to be used on this work, lack of sufficient traction for the canals, and the inability of the people of the liberated countries to acclimate themselves to working with the army. However, from the French and Belgians were obtained 25 additional tugs to be used on the waterways, and much material aid such as steel, cement, piling and other construction supplies necessary in reconstruction. The army furnished the liberated countries fuel for the operation of tugs and barges, and U. S. troops were used in many instances to supplement local labor in canal reconstruction.

191. Little Barge Traffic in South. Very little use was made of the inland waterways of southern France, except for local clearance at the port of Marseilles. However, as early as 23 September 1944, a self-propelled POL barge made the trip from Port-de-Bac to Lyon, arriving one week later, with POL for military installations in the Lyon area. Four such barges eventually were used on POL shuttle service on the Rhone River. CONAD utilized POL barges on the Saone River for supplies of the First French Army. Overall development of waterways in southern France for military purposes was not undertaken because of the long distances and long turn-around time involved, as well as because of the critical shortage of tugs.

192. Conclusion. The utilization of inland waterways should be given very close attention in the early phases of any campaign as a very highly desirable acquisition to sorely pressed truck and rail transportation, as demonstrated in this operation on the European continent. The use of barge transportation was responsible for a very sizeable amount of tonnage moved and in some cases in areas not readily accessible to other methods of transportation and along routes not used by trucks or railroads.

CHAPTER 21

SUPPLY COOPERATION WITH THE BRITISH

193. Joint Supply Operations.

a. POL. As set up in the planning of operation "OVERLORD", the British were to complete the operation "PLUTO", which was a submarine pipeline from the Isle of Wight to Cherbourg for their supply of gasoline, and a six-inch pipe line from Cherbourg to Rouen for this supply to reach their troops. But as this Pluto line never developed and the supply of gasoline was still needed, the US Forces, from their stocks of gasoline at Cherbourg pumped down this six-inch pipe line to Rouen approximately ten thousand barrels per day for their use. At various times during the year 1944, gasoline was taken off this line at Etreham for the use of US Forces in the beach areas. Also during the year 1944, the US Forces received bulk gasoline from the British at Petit Couronne, Ostend, Antwerp and the first part of 1945 saw the additional receipt of gasoline from the British at Calais which was the terminus of their Pluto operations on the continent. In addition to the above US Convoys refueled at British dumps and the men were served British rations and accomodations all through the campaign, when our convoys were in or near British installations.

b. When British units were in US Areas and some distance from British supply installations, units such as the British Army Staff in Paris, were assisted by supply and maintenance from US Army stocks, rations, gasoline, and various items of housekeeping equipment. Similar items were provided other British units scattered throughout the American Zone in liberated countries and which were isolated from normal British supply sources.

194. Antwerp and Ghent Port Agreement.

a. An agreement was reached by the British and US Forces on the joint use of Antwerp on 18 October 1944, which estimated port receipts to be approximately 40,000 tons per day, exclusive of POL, to be divided as follows: 17,500 tons for the British to be moved to British Advance Depots and 22,500 tons for the US Forces to be moved to depots in the Liege, Namur and the Luxembourg areas. The bulk POL installations of the Port were more than ample to meet all expected British and US requirements.

b. An agreement with the British was signed on 15 January 1945 for the joint use of the port of Ghent, similar to the agreement in effect at the port of Antwerp.

c. Joint operation of these ports, Antwerp and Ghent, were most successful and all cargo unloaded was adequately dispersed as called for in the agreements.

195. Supply for Joint Airborne Operations.

a. On 13 September 1944, it was necessary to furnish supplies into the forward area of the 21st Army Group (British) where a joint American-British airborne operation ("MARKET") looking to the securing of bridgeheads over the Waal River, was being mounted. The US Forces were to haul British supplies for their use from Bayeux to Brussels, approximately a 300 mile round trip. The assistance rendered theBritish was primarily the movement of British POL and more than half of the total of 18,555 tons hauled was in this classification. The remaining tonnage was American supplies for the British. In this

operation the British furnished and manned the bivouac areas, furnished water, rations and medical facilities. The US Forces had all of the operating responsibilities.

b. The life of this operation was from 16 September to 12 October 1944, and the job was done thoroughly and well, the daily haul averaging 625 tons over the 306 mile forward route as against the 500 ton target. Thus here was another instance of British-US cooperation.

196. Operation "GOLDFLAKE".

a. In February, 1945, it was necessary to move 102,415 British and Canadian troops from Italy to Belgium through the port of Marseilles, up through Southern France via Dijon and thence on up to Belgium. In this operation of truck and rail transportation, there was one rail halt, at Gevrey-Chambertin, and two bivouac areas, one at Chalon-sur-Saone and one in the vicinity of Montbard, these bivouac areas being provided with temporary billeting, latrine facilities, an emergency ration dump, refueling, oil and pressing facilities and ordnance maintenance teams. All areas were provided with messing facilities and medical teams, the rail stop was provided with water facilities, a kitchen running 24 hours a day, a hot meal being furnished during the two hour stop and sandwiches provided for the next meal.

b. Four trains per day passed through Gevrey-Chambertin, one personnel train of 1,200 people and three equipment trains at two hour intervals. The railroads handled 72,550 personnel and 4,035 trucks. Truck transportation accounted for 29,865 personnel and 23,560 trucks.

c. All services were performed by US Forces of Gen 3. The assistance of several British officers in handling the transportation problems of such a large number of British and Canadian troops, which was in excess of 500 miles overland, was of inestimable value.

197. Recovered Allied Military Personnel (British). During the rapid advance of the US Armies, a number of German prison camps and enclosures were overrun, but this did not come into being in any number until April, 1945, when the armies advanced deep into the German Reich. British prisoners recovered in Germany reached 166,400 of all ranks, and the British Liaison Officers working through the British Increment of the US Army handled arrangements for those uncovered in the US Army areas. Virtually all of the British except those hospitalized or too sick to be moved, were repatriated to the United Kingdom by the 15th of July 1945. The manifold duties and innumerable questions constantly arising out of the presence of both British and American Forces in large areas of Europe made the assistance of British Liaison Officers of great value, and to the mutual benefit of both countries.

CHAPTER 22

THE RHINE RAIL BRIDGES

198. Detailed Plans.

a. Detailed plans were made for the rehabilitation of the railroads and railroad bridges both west and east of the Rhine River, and included the assembly of huge stocks of material for the construction of three railroad bridges across the Rhine River at Wesel, Mainz, and Duisburg. On 8 April 1945 the Wesel bridge and on 14 April 1945 the Mainz bridge were completed and the bridge at Duisburg was completed on 8 May 1945. These three bridges opened the way into Germany east of the Rhine and up to 3 June 1945 had carried the following pay load tons:

Wesel	314,400 tons
Mainz	381,800 tons
Duisburg	23,900 tons

b. The construction of new bridges, complete, across the Rhine, in the record time accomplished was one of the great feats of modern engineering, and greatly simplified the supply situation of the forces advancing rapidly east of the Rhine.

199. Wesel Bridge. A railroad route into the heart of Germany was opened when the first railroad bridge linking the west and east banks of the Rhine River at Wesel was opened on 8 April 1945, ten days after construction started. Three thousand Engineers clipped four days off the time estimated for completing the single track bridge. This railroad link was made up of a main span of 1,750 feet, a bridge of 463 feet over the Lippe River, and a fill of 373 feet between the Rhine River and the Lippe River. The overall length was 2,588 feet. Double track approaches were constructed on both sides of the river. This bridge was named in honor of Major Robert Gouldin who lost his life there. Track work involved the construction of 13,692 feet of track and six turnouts.

200. Mainz River Bridges. This bridge was named in honor of President Roosevelt. At the 3,445 foot south Mainz Bridge it was found that a low level approach was available on the west bank and that approximately 1,380 feet of the old bridge could be used. This site also had the smallest river gap, ample storage tracks, and a water basin with ramps for launching floating equipment. This bridge was 2,215 feet long. Construction was started on 4 April and completed on 14 April 1945. The actual time of construction was 9 days and 12 hours.

201. Duisburg Bridge.

a. This bridge was named Victory Bridge, construction was started 2 May and completed on 8 May 1945, with a completion time of 6 days and 15 hours. The total length was 2,815 feet and consisted of 38 spans. The Engineers had previously prepared plans for a Rhine River crossing at another location, but their plans were quickly and successfully modified to such an extent that each unit and even each individual knew exactly what they were to do, and when to do it, even at the new location.

b. Without question, it was such detailed planning of organization and operation functions, coupled with the rugged experience gained in the preceding months, which permitted this job to be com-

pleted in such a remarkably short time. It should be added also, that the workmanship of the completed structure was of superior quality throughout, and the bridge will stand as a monument to all American Army Engineers for many years to come as a most outstanding achievement of military engineering history.

202. Other Bridges. Two other railroad bridges of note were completed over the Rhine River in the Sixth Army Group Zone. They were:

a. The Ernie Pyle Bridge, between Ludwigshafen and Mannheim, having a length of 937 feet. It was started 8 April, completed 23 April 1945, with a completion time of 16 days.

b. The Thomas J. Dooley Bridge, at Karlsruhe in the French First Army Zone had a length of 853 feet. It was started 17 April and completed 29 April 1945 with a completion time of 13 days.

c. One two-way highway bridge was completed at Strassbourg on 19 April 1945, being composed of two Baily bridges on floating pontoons.

CHAPTER 23

SIGNAL COMMUNICATIONS

203. A general can be a Commanding General only when he can talk to the troops he commands; therefore, to insure his orders being carried out he must have communications. The responsibility for all communications belonged to the Signal Corps, whose mission with the invasion forces was both dangerous and varied, communications being composed of extensive and highly technical operation, right up to the front lines.

204. Landing with the assault troops on D Day, their basic function was to furnish radio, wire and messanger communication facilities to the Beach Command and Brigade Organizations. From the beaches, the Signal Corps technicians followed the trail which the American armor had blazed across France, sometimes ahead, but usually just behind the Infantry. Telephone men were forced to keep the field forces in touch with their rear headquarters and supply depots, frequently stringing wires along hedges and through trees.

205. The following tabulation indicates what had to be accomplished during the early stages of the Northern Operation and during the rapid advance to the east.

SIGNAL CORPS ACCOMPLISHMENTS

D-Day, 6 June to 30 September 1944

Number of repeater stations installed----------	280
Number of switchboards installed----------	28
Number Teleprinter Machines----------	28
Number Teleprinter Switchboards----------	9
Number Repeater Stations Manned----------	13
Number local telephones installed----------	295

Type Construction	D-Day to 30 Aug (wire miles)	1 Sept to 30 Oct (wire miles)	Total
New open wire construction	7,084	2,240	9,324
Open wire rehabilitation	582	8,002	8,536
Railroad rehabilitation	1,782	9,354	11,136
Spiral four cable installed	135	153	288
Field Wire	510	277	787
	(circuit miles)	(circuit miles)	
New Cable	1,099	30	1,129
Cable rehabilitation	4,354	12,012	16,366

206. Continuously working to establish communications with all echelons of command, and at the same time keeping up with the rapidly advancing armies was accomplished through patience and perseverance, until at the end of 1944, the American wire system comprised roughly, 2,500 miles long distance underground cable circuits rehabilitated from the French system. In the completed system they totaled some 125,000 circuit miles, or about 250,000 wire miles. There were also built 1,200 miles of pole line construction, and using 20,000 miles of copper wire to rehabilitate 3,300 miles of French pole line.

207. From the beginning to the end of the Continental operations, the Signal Corps maintained this elaborate system to such perfection that practically any headquarters, depot or other installations was as near as the nearest available telephone.

CHAPTER 24

FINAL CONCLUSIONS

208. Supply and maintenance planning for both operations in France was based upon the best available data, established theories and practice. Lack of actual experience in operations of this scope was a handicap, throughout all echelons.

209. Logistical organizations employed in Com Z varied greatly in their content of personnel and consequently in their previous over-all experience. The final organization of the Com Z on the Continent could not be definitely settled, nor any final phasing schedule prepared until the tactical progress was achieved. As soon as it became evident, after the Seine River was crossed late in August, 1944, that Brittany Peninsula would not become a major geographical area of Com Z, because of the rapid movement to the east, plans were made for Com Z organization to be centered in Paris, with lines of communication passing through or past Paris to the northeast.

210. Direct supply of the advancing armies was strained to the utmost during the first five months of both operations and not until November could any real concrete static organization be accomplished, although, prior to November all kinds of improvisation were instituted by all echelons of Com Z to keep supplies rolling forward. In general, and until Antwerp opened on 28 November, it was impossible to build up any permanent logistical structure, because, until that time the emphasis had had to be on getting supplies forward to the Armies.

211. Many of the problems encountered by Com Z in this complicated operation were caused by unforeseen developments in isolated parts of the area, or under isolated localized conditions, in which individual echelons or units were effected, and such that the general picture of the conditions was not, and perhaps could not be thoroughly understood and appreciated until that condition was thoroughly studied by the higher echelons. In many instances a situation was neither foreseen nor properly evaluated until the highest echelon in the Theater was able to study it and provide a solution. Thus, time was lost until the solution could be determined and the necessary corrective action taken. In the meantime, lower echelons may have suffered because of their local inability to solve the situation. This is an inevitable problem to be encountered many times during the development and progress of a military operation of comparable size to that in the European Theater of Operations in 1944-45. The solution is careful planning and meticulous advance study, with flexibility of accomplishment of instantaneous corrective measures.

212. Several typical examples are as follows:

a. The unforeseen storm of 19-22 June that wrecked the artificial harbor and caused the loss of several very valuable days in unloading much needed supplies.

b. The heavy fog and mist that grounded the Allied Air Force for five long days, during the Ardennes offensive from 16 December to 22 December 1944.

c. The unusual heavy rains during the fall, and melting of snow during the winter and early spring that caused the heaviest floods since 1905, combined with the very severe winter, added materially to already mounting difficulties.

213. The above were all "ACTS OF GOD" which could not have been foreseen and while some conditions could be partially planned for, all of them combined could never have been anticipated and covered adequately in any planned military campaign. These events created by nature all contributed materially toward upsetting the Logistical as well as the Tactical operations, caused unexpected delays and, in general, forced a condition of confusion and great uncertainty, especially while the particular phases of the operation concerned were at their most critical stage.

214. Another type of condition encountered as a result of faulty planning, was the promising to the Armies of specified amounts of POL which were in excess of port capacity. Another was the allocation of tonnage of rail freight that did not take into consideration large bulky items such as bridge material and which required more rail cars than was allocated for the tonnage haul.

215. Additional conclusions based on the factual data presented in this report have been incorporated in the several chapters in which logical conclusions could be determined.

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G-5 Supplies in ETO.
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ESTABLISHED ABBREVIATIONS

ETOUSA	-	European Theater of Operations, United States Army.
FUSA	-	First United States Army.
TUSA	-	Third United States Army.
BUCO	-	Build-Up Control Office.
ADSEC	-	Advance Section.
Com Z	-	Communications Zone, ETOUSA.
UK	-	United Kingdom.
SOLOC	-	Southern Lines of Communications.
SOS	-	Services of Supply.
POW	-	Prisoners of War.
CONAD	-	Continental Advance Section.
SHAEF	-	Supreme Headquarters, Allied Expeditionary Force.
US	-	United States.
OCOT	-	Office of Chief of Transportation.
USSTAF	-	United States Strategical-Tactical Air Force.
SOP	-	Standard Operating Procedures.

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6. - Daily Average by Months by Ports, D - VE Day

7. - Stock Levels, Normandy Base Section, November 44 to 5 May 45.

8. - Evacuation of Patients, NBS - August 1944 to VE Day

9. - Supply from Flank Ports versus Rear Ports.

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11. - "DRAGOON" First 30 days

12. - Railway Rehabilitation Chart

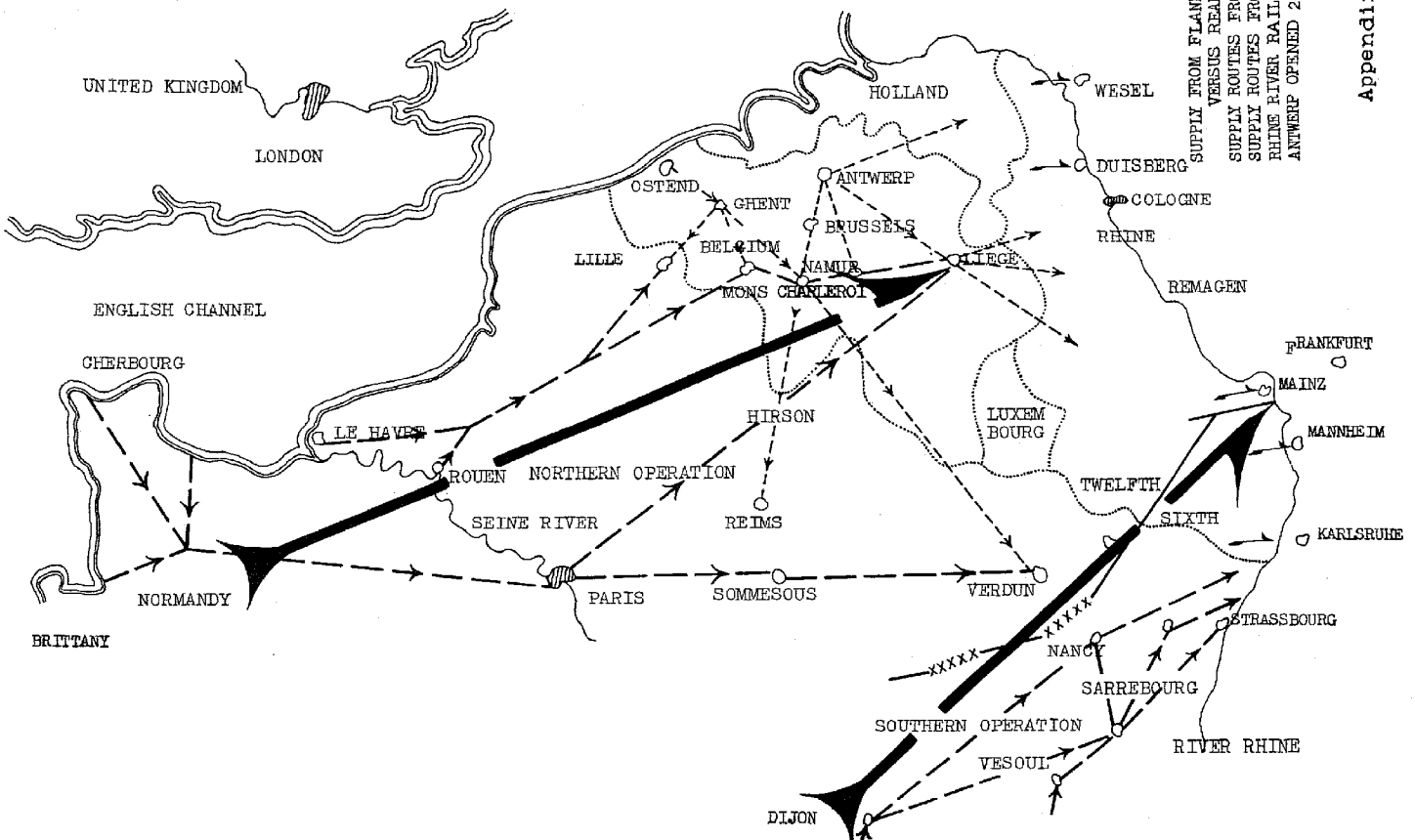
13. - Red Ball Highway System.

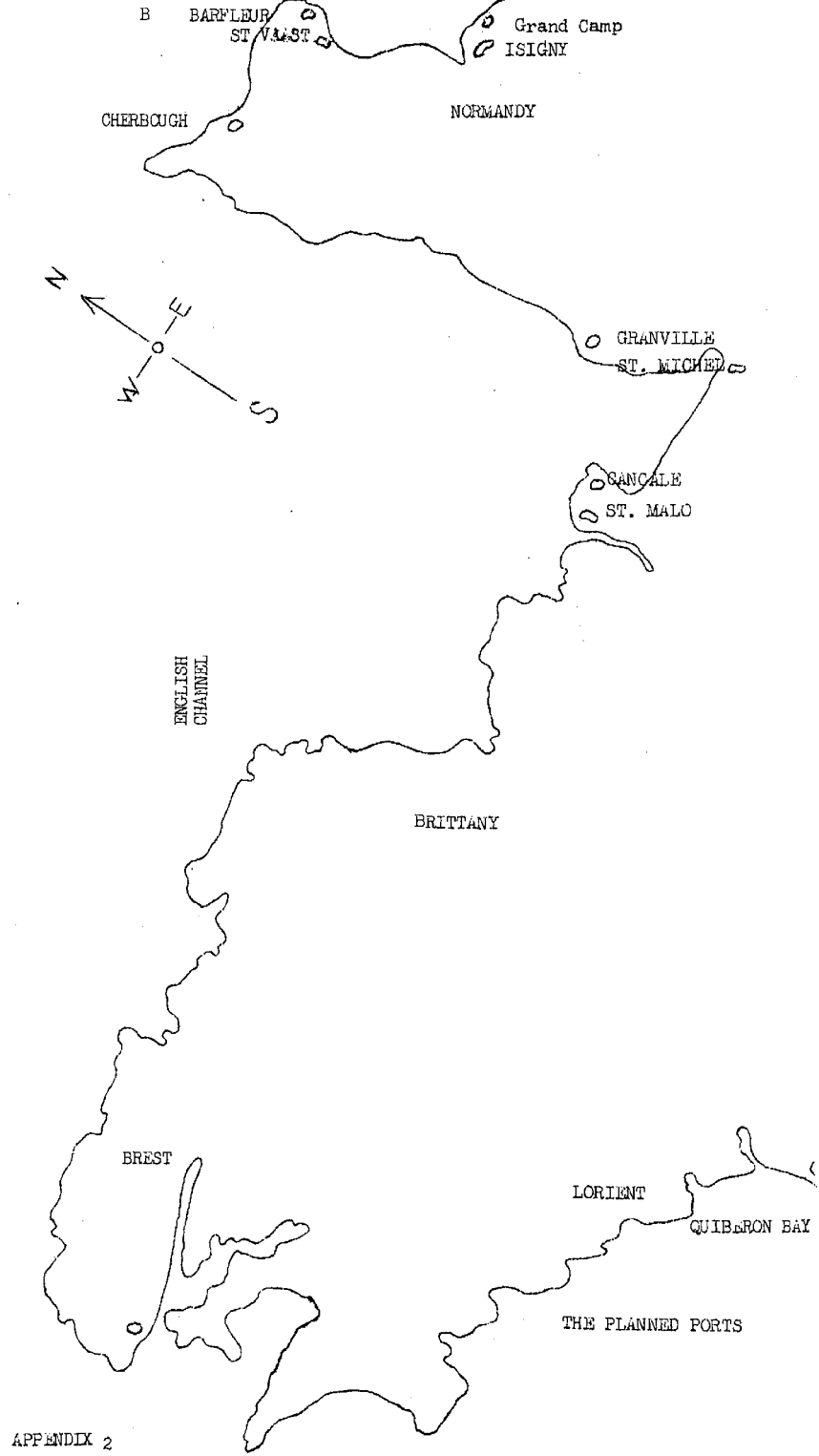
14. - Communications Zone Boundaries 8 May 1945

Northern Operation Calendar

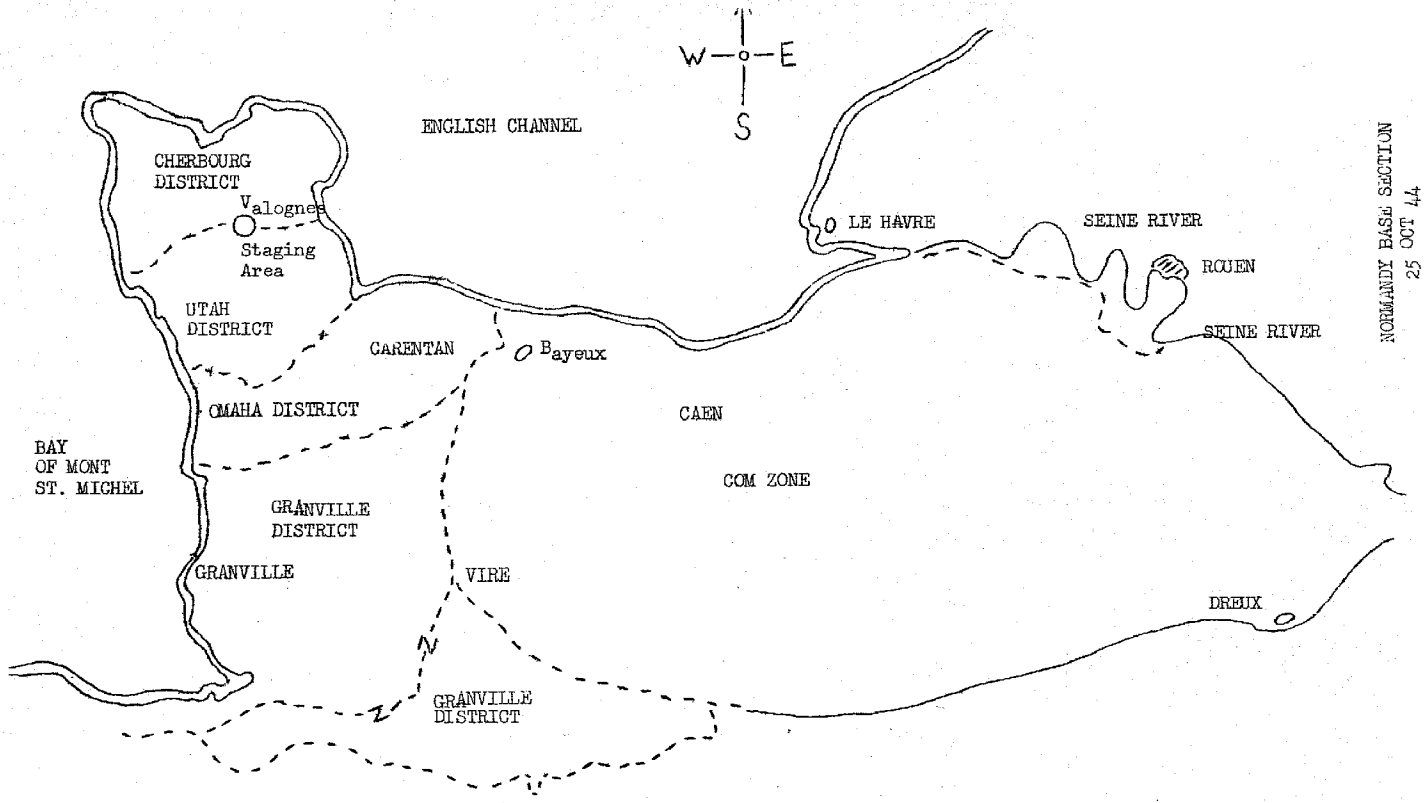
Southern Operation Calendar

Appendix 1


SUPPLY FROM FLANK PORTS
VERSUS REAR PORTS
SUPPLY ROUTES FROM REAR
SUPPLY ROUTES FROM FLANK
RHINE RIVER RAIL BRIDGES
ANTWERP OPENED 28 NOV 45
UNITED KINGDOM
LONDON
ENGLISH CHANNEL
CHERBOURG
NORMANDY
BRITTANY
LE HAVRE
ROUEN
NORTHERN OPERATION
SEINE RIVER
PARIS
SOMMESOUS
VERDUN
REIMS
HIRSON
LILLE
OSTEND
GHENT
ANTWERP
BRUSSELS
BELGIUM
NAMUR
MONS CHARLEROI
LIEGE
HOLLAND
LUXEM BOURG
WESEL
DUISBERG
COLOGNE
RHINE
REMAGEN
FRANKFURT
MAINZ
MANNHEIM
KARLSRUHE
STRASSBOURG
TWELFTH
SIXTH
NANCY
SARREBOURG
SOUTHERN OPERATION
VESOUL
DIJON
RIVER RHINE

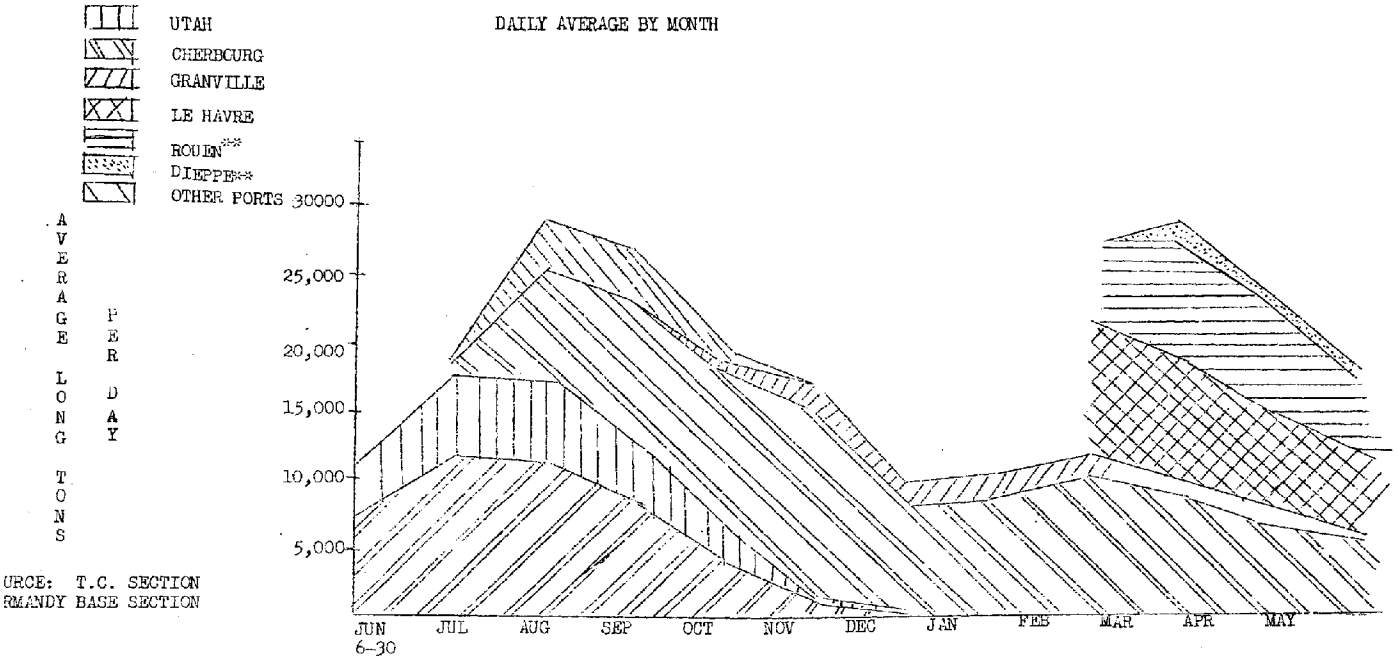

B
BARFLEUR
ST VAAST
Grand Camp
ISIGNY
CHERBOUGH
NORMANDY
N
E
W
S
GRANVILLE
ST. MICHEL
CANCALE
ST. MALO
ENGLISH CHANNEL
BRITTANY
BREST
LORIENT
QUIBERON BAY
THE PLANNED PORTS

APPENDIX 2



NORMANDY BASE SECTION
25 OCT 44

APPENDIX 3

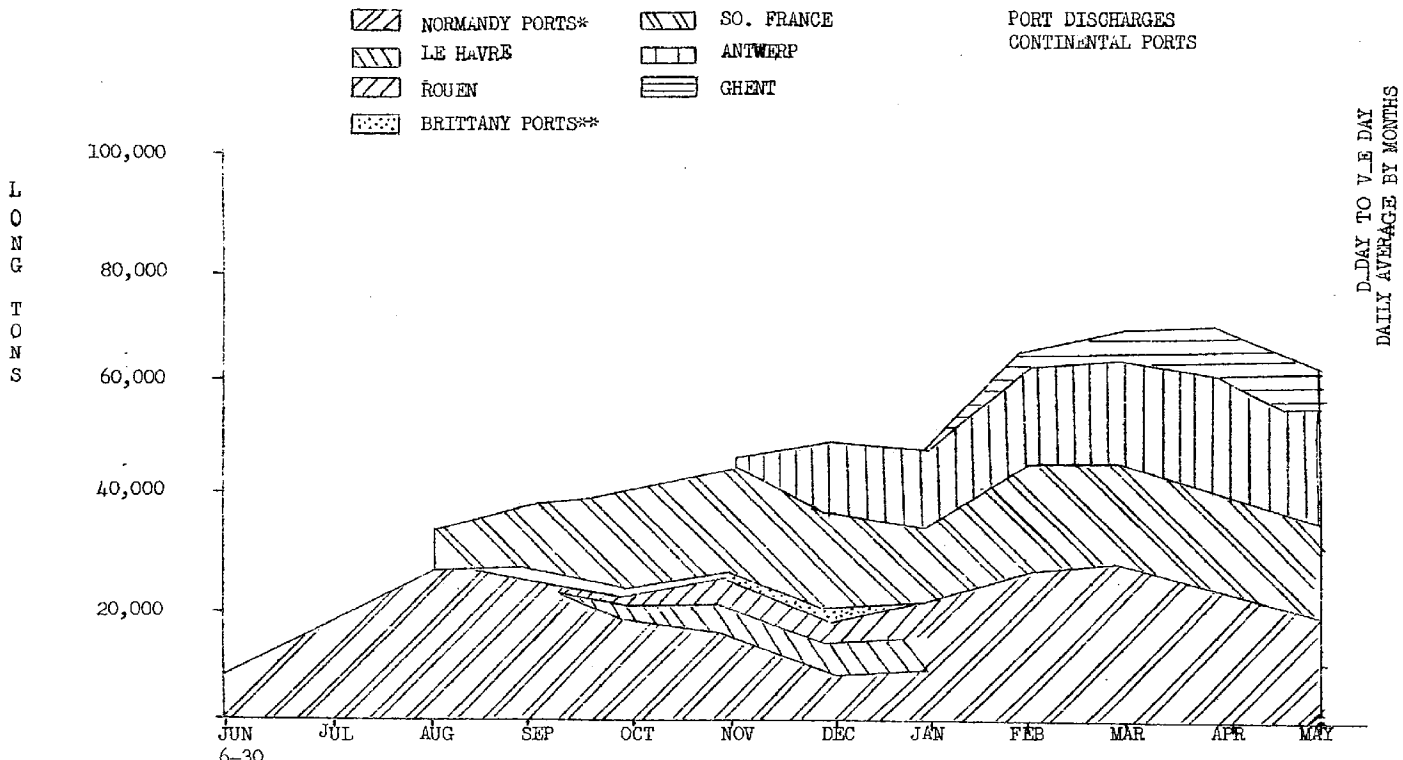


URCE: T.C. SECTION
RMANDY BASE SECTION

NOTE*DOES NO INCLUDE BULK POL
**INCLUDED AS OF FEB.
OTHER PORTS INCLUDE ST. VAAT, GRANDCAMP, CARENTAN, BARFLEUR

TONNAGE DISCHARGES ALL PORTS
NORMANDY BASE SECTION
D_DAY TO VE DAY

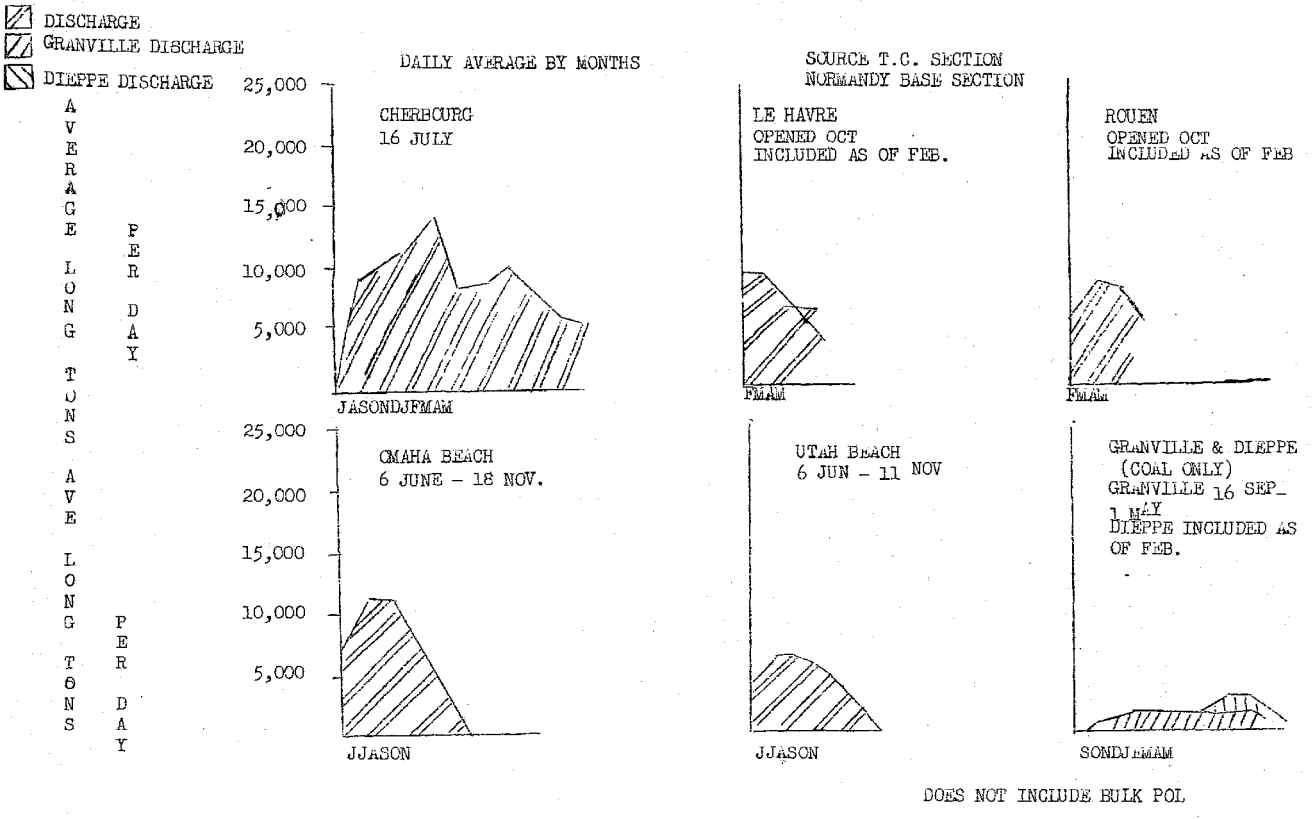
APPENDIX 4



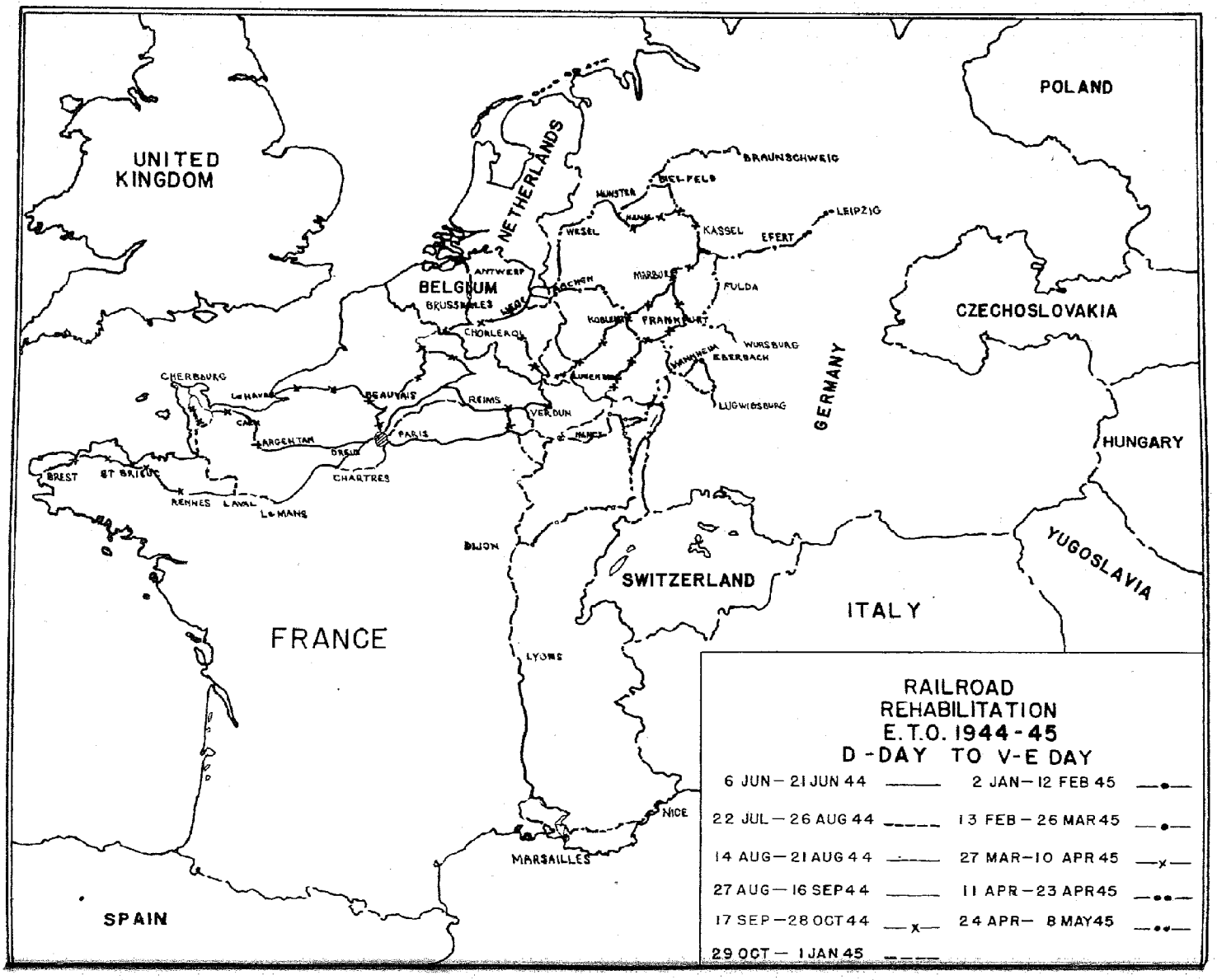
SOURCE: CHIEF OF TRANSPORTATION COMMUNICATION ZONE

NOTE: *NBS INCLUDES LE HAVRE AND ROTTERDAM

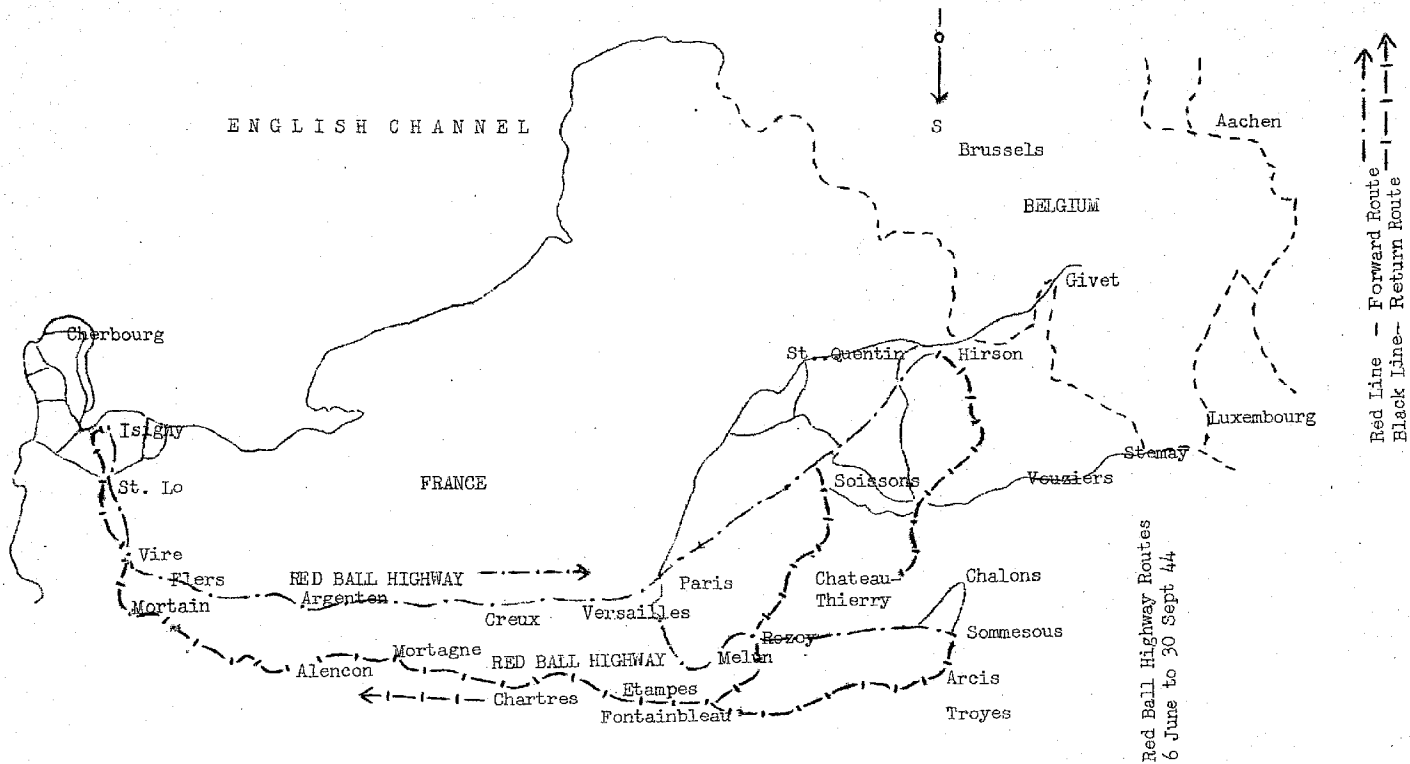
APPENDIX 5


DISCHARGE
GRANVILLE DISCHARGE
DIEPPE DISCHARGE
DAILY AVERAGE BY MONTHS
SOURCE T.C. SECTION
NORMANDY BASE SECTION
AVERAGE LONG TONS PER DAY
AVE LONG TONS PER DAY
25,000
20,000
15,000
10,000
5,000
CHERBOURG
16 JULY
JASONDJFMAM
LE HAVRE
OPENED OCT
INCLUDED AS OF FEB.
FMAM
ROUEN
OPENED OCT
INCLUDED AS OF FEB
FMAM
OMAHA BEACH
6 JUNE - 18 NOV.
JJASON
UTAH BEACH
6 JUN - 11 NOV
JJASON
GRANVILLE & DIEPPE
(COAL ONLY)
GRANVILLE 16 SEP - 1 MAY
DIEPPE INCLUDED AS
OF FEB.
SONDJFMAM
TONNAGE DISCHARGE BY PORTS
NORMANDY BASE SECTION
D-DAY TO V-E DAY
DOES NOT INCLUDE BULK POL

APPENDIX 9

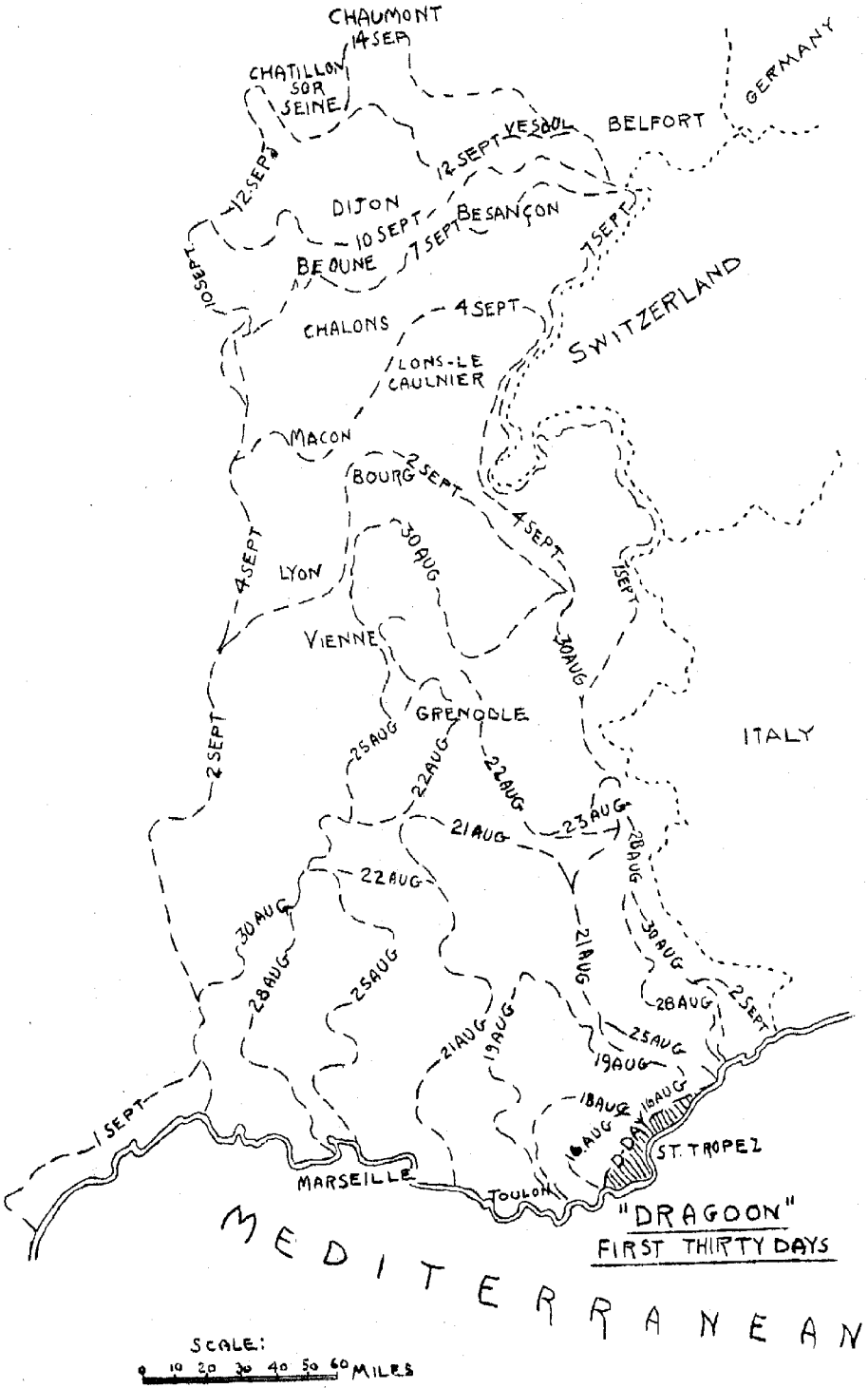

UNITED KINGDOM
NETHERLANDS
BELGIUM
POLAND
CZECHOSLOVAKIA
GERMANY
HUNGARY
YUGOSLAVIA
SWITZERLAND
ITALY
FRANCE
SPAIN
BRAUNSCHWEIG
BIELFELD
MUNSTER
LEIPZIG
KASSEL
EFERT
WESEL
ANTWERP
MARBURG
FULDA
BRUSSELS
CHORLEROI
FRANKFURT
WURSBURG
EBERBACH
LUGWIGSBURG
CHERBOURG
BEAUVAIS
REIMS
VERDUN
PARIS
CHARTRES
BREST
ST BRIEUC
RENNES
LAVAL
LE MANS
DIJON
LYONS
NICE
MARSAILLES
RAILROAD
REHABILITATION
E.T.O. 1944-45
D-DAY TO V-E DAY
6 JUN – 21 JUN 44
22 JUL – 26 AUG 44
14 AUG – 21 AUG 44
27 AUG – 16 SEP 44
17 SEP – 28 OCT 44
29 OCT – 1 JAN 45
2 JAN – 12 FEB 45
13 FEB – 26 MAR 45
27 MAR – 10 APR 45
11 APR – 23 APR 45
24 APR – 8 MAY 45

Appendix 7

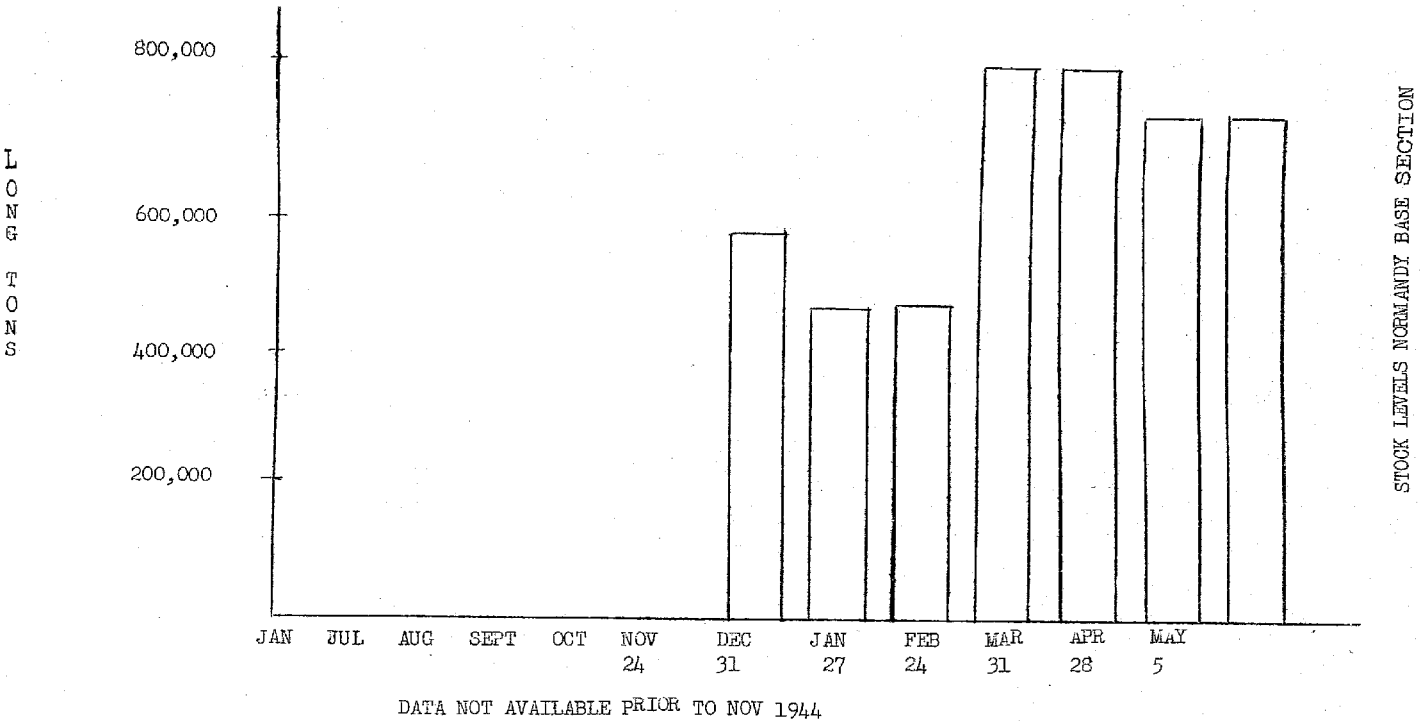


Red Ball Highway Routes
6 June to 30 Sept 44

APPENDIX 8


CHAUMONT
14 SEP
CHATILLON SOR SEINE
12 SEP
12 SEPT
VESOUL
BELFORT
GERMANY
DIJON
10 SEPT
BESANÇON
7 SEPT
7 SEPT
BEAUNE
10 SEPT
SWITZERLAND
CHALONS
4 SEPT
LONS-LE CAULNIER
MACON
BOURG
2 SEPT
4 SEPT
30 AUG
4 SEPT
LYON
7 SEPT
VIENNE
30 AUG
GRENOBLE
ITALY
2 SEPT
25 AUG
22 AUG
22 AUG
23 AUG
21 AUG
28 AUG
22 AUG
30 AUG
28 AUG
25 AUG
21 AUG
30 AUG
28 AUG
2 SEPT
21 AUG
19 AUG
25 AUG
19 AUG
1 SEPT
18 AUG
16 AUG
16 AUG
D-DAY
ST. TROPEZ
MARSEILLE
TOULON
"DRAGOON"
FIRST THIRTY DAYS
MEDITERRANEAN
SCALE:
0 10 20 30 40 50 60 MILES

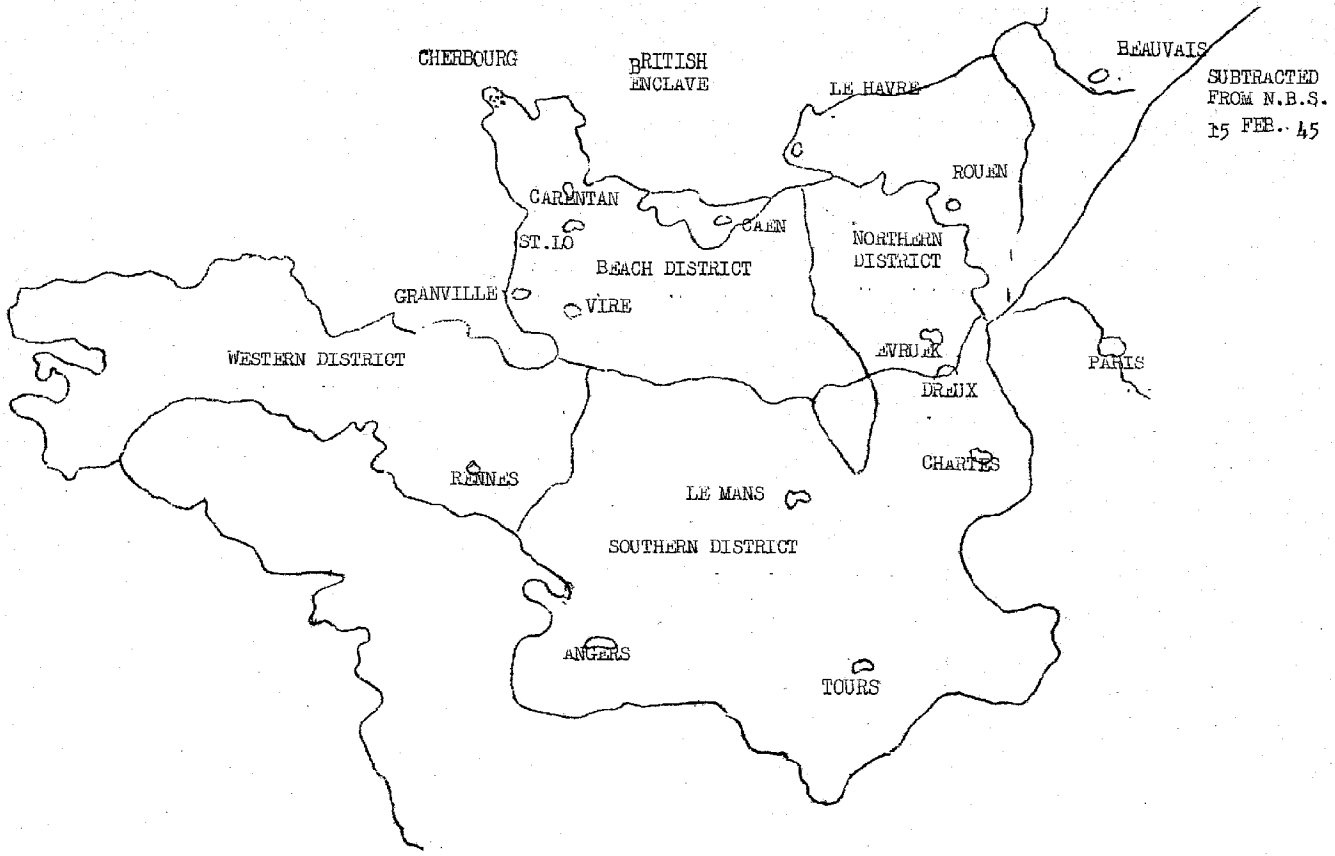
Appendix 9

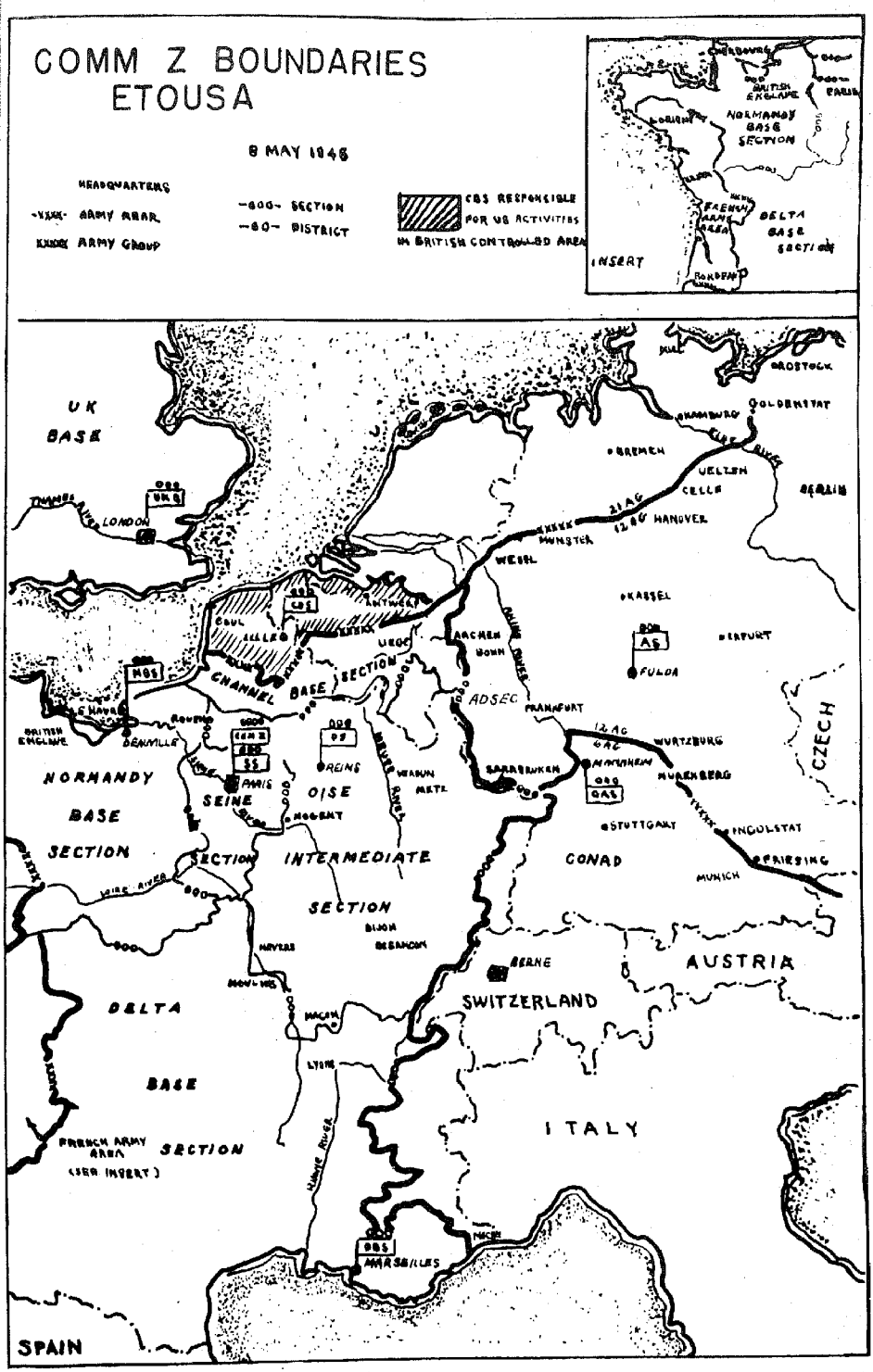

STOCK LEVELS NORMANDY BASE SECTION
LONG TONS
800,000
600,000
400,000
200,000
JAN
JUL
AUG
SEPT
OCT
NOV 24
DEC 31
JAN 27
FEB 24
MAR 31
APR 28
MAY 5
DATA NOT AVAILABLE PRIOR TO NOV 1944

APPENDIX 10

APPENDIX 11

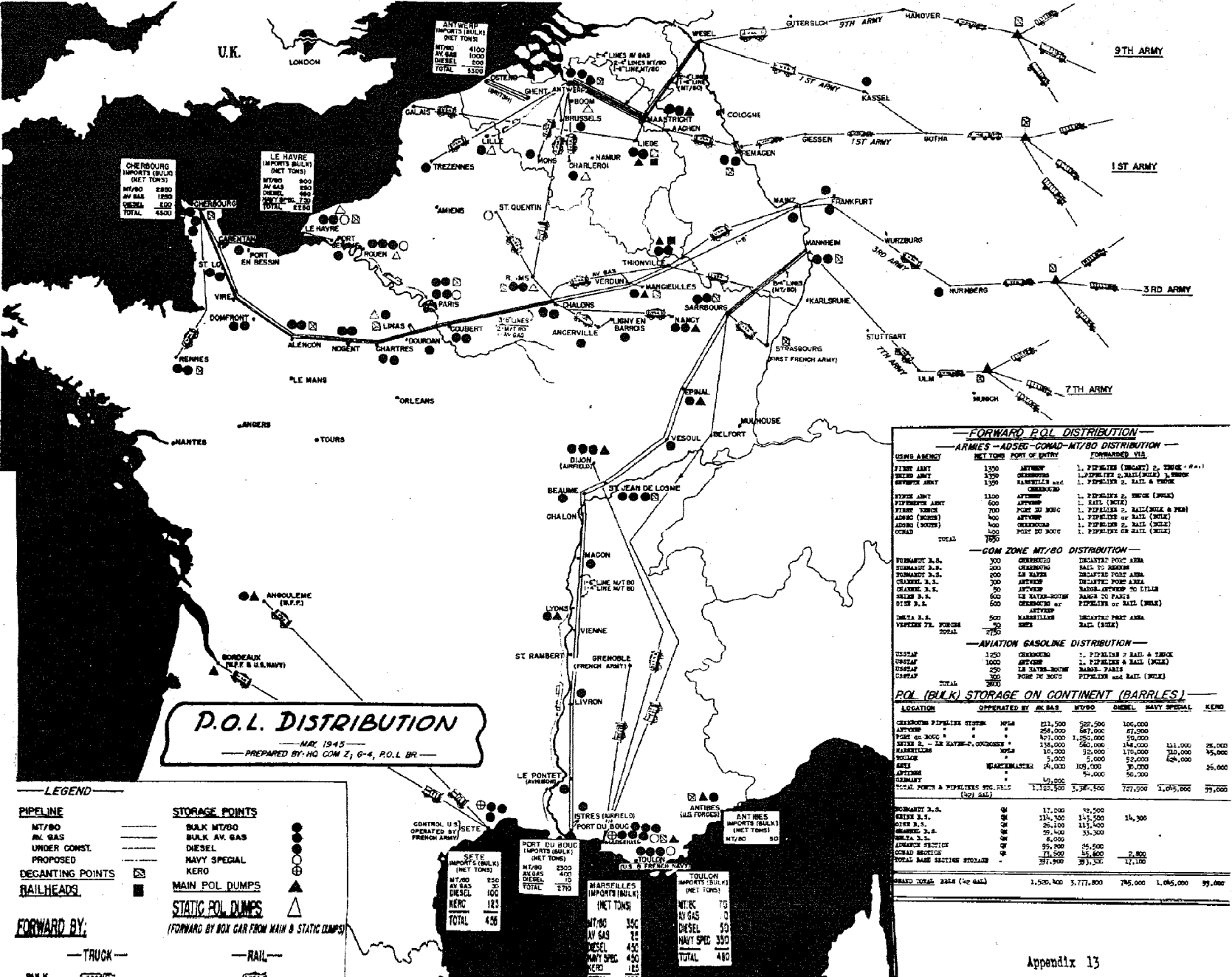
NORMANDY BASE SECTION
BOUNDARIES
1 MARCH 1945





Appendix 12

COMM Z BOUNDARIES ETOUSA 8 May 1945



FORWARD P.O.L DISTRIBUTION

ARMIES – ADSEC – COMAD – MT/80 DISTRIBUTION

USING AGENCY	NET TONS	PORT OF ENTRY	FORWARDED VIA
FIRST ARMY	1350	ANTWERP	1. PIPELINE (BRIGANT) 2. TRUCK - Rail
NINTH ARMY	3350	CHERBOURG	1. PIPELINE 2. RAIL (BULK) 3. TRUCK
SEVENTH ARMY	1350	MARSEILLES and CHERBOURG	1. PIPELINE 2. RAIL & TRUCK
THIRD ARMY	1100	ANTWERP	1. PIPELINE 2. TRUCK (BULK)
FIFTEENTH ARMY	600	ANTWERP	1. RAIL (BULK)
FIRST TRUCK	700	PORT DU BOUC	1. PIPELINE 2. RAIL (BULK & PKG)
ADSEC (BULK)	400	ANTWERP	1. PIPELINE or RAIL (BULK)
ADSEC (BULK)	400	CHERBOURG	1. PIPELINE 2. RAIL (BULK)
COMAD	400	PORT DU BOUC	1. PIPELINE OR RAIL (BULK)
TOTAL	7850		

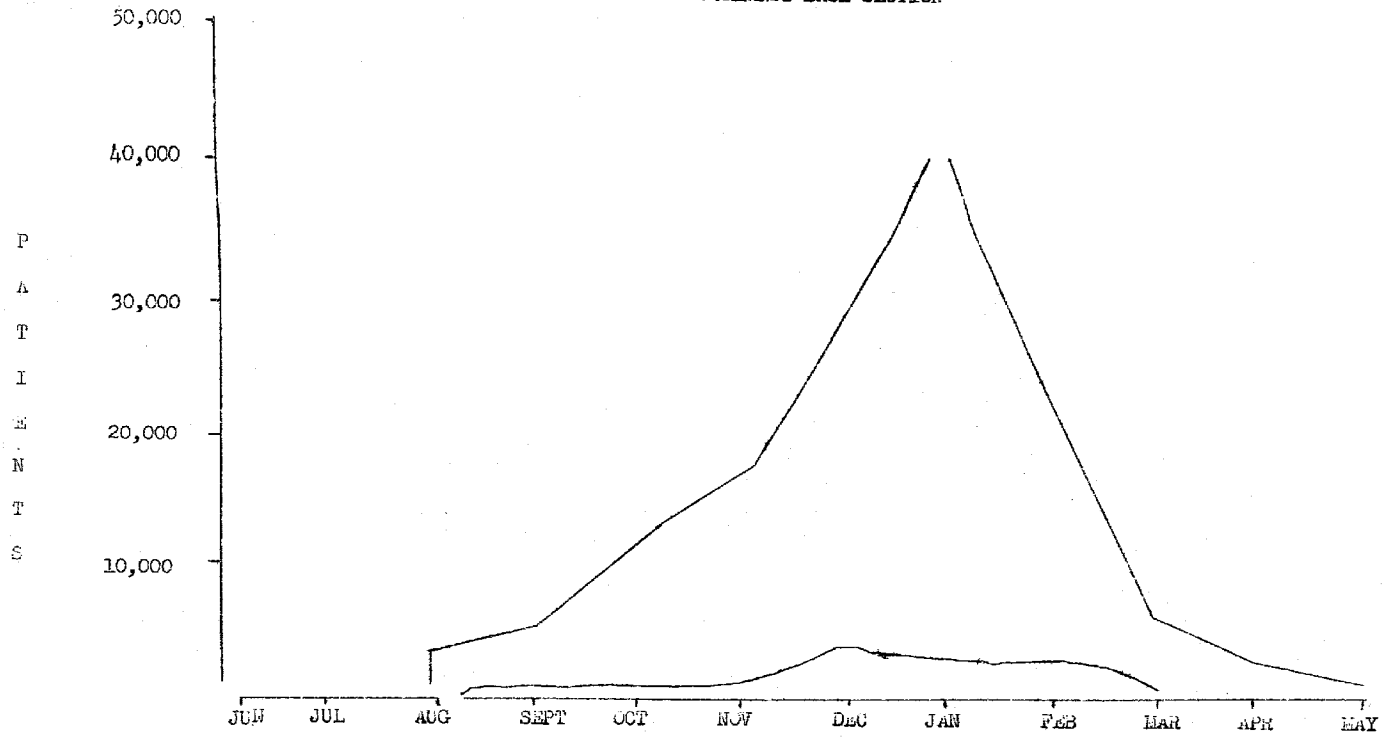
COM ZONE MT/80 DISTRIBUTION

NORMANDY B.S.	300	CHERBOURG	DECANTING PORT AREA
NORMANDY B.S.	200	CHERBOURG	RAIL TO REIMS
NORMANDY B.S.	200	LE HAVRE	DECANTING PORT AREA
CHANNEL B.S.	300	ANTWERP	DECANTING PORT AREA
CHANNEL B.S.	50	ANTWERP	RAIL - ANTWERP TO LILLE
SEINE B.S.	600	LE HAVRE-ROUEN	RAIL TO PARIS
SEINE B.S.	600	CHERBOURG or ANTWERP	PIPELINE or RAIL (BULK)
DELTA B.S.	500	MARSEILLES	DECANTING PORT AREA
VESTERN FR. FORCES	50	SETE	RAIL (BULK)
TOTAL	2750		

AVIATION GASOLINE DISTRIBUTION

USSTAF	1250	CHERBOURG	1. PIPELINE 2 RAIL & TRUCK
USSTAF	1000	ANTWERP	2. PIPELINE & RAIL (BULK)
USSTAF	250	LE HAVRE-ROUEN	RAIL - PARIS
USSTAF	300	PORT DU BOUC	PIPELINE and RAIL (BULK)
TOTAL	2800		

POL (BULK) STORAGE ON CONTINENT (BARRLES)

LOCATION	OPPERATED BY	AV GAS	MT/80	DIESEL	NAVY SPECIAL	KERO
CHERBOURG PIPELINE SYSTEM	NPSA	211,500	522,500	100,000		
ANTWERP " "	"	258,000	587,000	67,300		
PORT du BOUC " "	"	427,000	1,250,000	50,000		
SETE & - LE HAVRE-P. COUDEKERK "	"	118,000	560,000	148,000	111,000	25,000
MARSEILLES	NPSA	10,000	310,000	170,000	310,000	45,000
TOULON	"	5,000	5,000	52,000	64,000	
ANTI	MEDITERRANEAN	24,000	109,000	30,000		26,000
APTIANS	"		54,000	50,000		
GERMANY	"	40,000				
TOTAL FORCE & PIPELINES STG. BULK (42 GAL)		1,123,500	3,387,500	727,500	1,085,000	99,000
NORMANDY B.S.	SC	17,500	72,500			
SEINE B.S.	SC	114,300	143,500	14,300		
SEINE B.S.	SC	25,100	113,500			
CHANNEL B.S.	SC	29,400	33,300			
DELTA B.S.	SC	8,000				
AVIATION SECTION	SC	95,200	35,500			
COMAD SECTION	SC	71,500	45,600	2,800		
TOTAL BASE SECTION STORAGE	-	357,900	393,500	17,100		
GRAND TOTAL BULK (42 GAL)		1,520,400	3,777,800	745,000	1,085,000	99,000

EVACUATION OF PATIENTS
NORMANDY BASE SECTION