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THE GENERAL BOARD

United States Forces, European Theater

OPERATION, ORGANIZATION, SUPPLY, AND SERVICES OF THE TRANSPORTATION CORPS IN THE EUROPEAN THEATER OF OPERATIONS

MISSION: Prepare report and recommendations based upon findings and conclusions drawn from an overall review of the operations, organization, supply, and services of the Transportation Corps in the European Theater of Operations.

The General Board was established by General Orders 128, 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.

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Further information concerning the Motor Transport Service, The Military Railway Service, and Supply Movement and Control are given in the following studies of the General Board, United States Forces, European Theater:

Study No.123 Military Railway Service

Study No 124 Procedures for the Control of Supply and Personnel Movements

Study No 125 Motor Transport Service as a Permanent Part of the Transportation Corps

THE GENERAL BOARD
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OPERATION, ORGANIZATION, SUPPLY, AND SERVICES OF THE TRANSPORTATION CORPS IN THE EUROPEAN THEATER OF OPERATIONS

Prepared by:
Colonel Loren A. Ayers, 0-18561, Chief, section in charge.
Lt. Col. William F. Schultz, Jr., 0-265729, Transportation Section

Principal consultants:
Major General Frank S. Ross, 0-10213, Chief of Transportation, Theater Service Forces, European Theater.
Brigadier General Burton O. Lewis, 0-2838, Chief of Supply Division, Transportation Corps, Army Service Forces, War Department, Washington, D.C.
Brigadier General Clarence L. Burpee, 0-423035, Director General, Military Railway Service, Theater Service Forces, European Theater.
Colonel David J. Traub, 0-17110, Deputy Chief of Transportation, Theater Service Forces, European Theater.
Colonel Donald S. McConnaughy, 0-9738, Deputy Chief of Transportation, Theater Service Forces, European Theater (Rear).
Colonel I.J. Littell, 0-244034, Transportation Officer, Seventh U.S. Army.
Colonel J.C. Waddell, 0-13919, Assistant Chief of Transportation, Supply Division, Office, Chief of Transportation, Theater Service Forces, European Theater.
Colonel Robert E. Trippe, 0-18972, Transportation Officer, Third U.S. Army.
Lt. Col. C.H. Olsen, 0-244795, Chief, Planning and Control Division, Office, Chief of Transportation, Theater Service Forces, European Theater.
Lt. Col. S.F. Hyde, 0-499610, Acting Assistant Chief of Transportation, Marine Operations Division, Office, Chief of Transportation, Theater Service Forces, European Theater.
Lt. Col. Earle S. Temple, 0-252401, Chief, Motor Transport Division, Transportation Section, United Kingdom Base, Theater Service Forces.
Lt. Col. Herbert L. Phyffe, 0-245936, Chief, Packing and Marking Branch, Planning and Control Division, Office, Chief of Transportation, Theater Service Forces, European Theater.
Lt. Col. Raymond H. Tiffany, 0-20348, Division Quartermaster 17 Airborne Division, Executive Officer, and Chief, Supply Division Quartermaster Section, The General Board, Fifteenth U.S. Army.
Lt. Col. Daniel L. Miller, 0-189278, Commanding Quartermaster Battalion, XIX Corps, Member, Quartermaster Section, The General Board, Fifteenth U.S. Army.

THE GENERAL BOARD
UNITED STATES FORCES, EUROPEAN THEATER
APO 408

PART ONE

FUNCTIONS AND ORGANIZATION OF THE TRANSPORTATION CORPS

CHAPTER 1

THE FUNCTIONS OF THE TRANSPORTATION CORPS

SECTION 1

THE FUNCTIONS OF THE TRANSPORTATION CORPS

1. Establishment of the Transportation Corps. The Transportation Corps was established by War Department General Order 38, 1942, as amended by Section I, General Order 62, 1942, and was assigned the functions formerly belonging to the Water Transport Branch of the Quartermaster Corps. The operation of military railways, formerly an activity of the Corps of Engineers was transferred to the Transportation Corps by War Department; General Order 60, 1942, as amended by Section II, General Order 66, 1942. These orders, although they stated that the Chief of Transportation was "charged with the direction, supervision, and co-ordination of all transportation functions for the War Department and with the operation of field installations pertaining thereto," did not deal with the operation of motor transport, which remained a responsibility of the Quartermaster Corps. These General Orders contemplated the Transportation Corps as a war-time service, to be terminated six months after the conclusion of hostilities.

2. The Mission of the Transportation Corps.

a. At the time of appreciation of Operation "Overlord," the functions for which the Transportation Corps was responsible were stated in War Department General Orders to be the following:

(1) Planning activities in connection with transportation requirements, and the implementation of these plans.

(2) Technical supervision of traffic control, under the Assistant Chief of Staff, G-4, of those installations and commands authorized a general staff.

(3) Operation of ports of embarkation and debarkation.

(4) Operation of military railways.

(5) Operation of inland waterways.

b. In the European Theater of Operations, the Transportation Corps had also, by that time, been made responsible for the operational control of motor transport. The reason for existence of the Transportation Corps is to provide for the bulk transportation of military personnel and its impedimenta and supplies, from origin to destination. This required careful planning, co-ordination, and integration of all

forms of transportation. All forms of transportation, other than air, were technically under the control of the Chief of Transportation within the Communications Zone. The only element lacking was actual command--the ability to move the organizations freely enough to meet local situations and changing requirements, when such action would benefit the whole plan.

3. Relation to Communications Zone.

a. Under existing Theater policy, the Transportation Corps was a Communications Zone agency, with the bulk of its troops, facilities, and installations forming a part thereof. There were no exempted activities under the command of the Chief of Transportation, as were the ports of embarkation in the Zone of the Interior. Command functions were retained by the Commanding General, Communications Zone, and decentralized to the Commanding Generals of the Sections of the Communications Zone. The Chief of Transportation exercised technical control only over the functional services of the Transportation Corps, but the interpretation of this control was, however, usually flexible enough to accomplish whatever centralized control of transportation was required, when such authority had not otherwise been delegated by the Commanding General of the Communications Zone.

b. The policy of decentralization to which the United States Army in the European Theater of Operations was committed--while at times a handicap to transportation activities where inter-sectional operations were concerned--served to mitigate early communications difficulties on the Continent. The Sections of the Communications Zone operated transportation units relatively effectively, insofar as the actual movement of men and material was concerned. The difficulties inherent in decentralized control arose because of the complicated channels through which co-ordination and integration of the activities of the whole transportation system had to be effected. This condition created time-lag, and confusion as to final responsibility. The increased efficiency of the transportation system, after a more adequate degree of centralized control had been secured under the direction of the Chief of Transportation, demonstrated the value of such centralization.

4. Relation to Armies. Under FM101-15, traffic control was a function of the Transportation Section, G-4, of any organization or installation authorized to have a general staff. At the same time, a Transportation Section was provided in the staff organization of the Quartermaster, for the operational control of Motor Transport units, which was a Quartermaster responsibility within the field forces. This divided responsibility for transportation activities between the Assistant Chief of Staff, G-4, and the Quartermaster. Several variations of this general plan were employed by Armies during the course of operations. In the First, Ninth, and Fifteenth Armies, movement control was co-ordinated by the Transportation Section, G-4, and operational control of motor transport units was retained by the Quartermaster. In the Third Army, the Transportation Officer controlled under the Assistant Chief of Staff, G-4, all transportation activities,[1] including the operational control of Motor Transport units assigned to that Army. In the Seventh Army, the Transportation Officer exercised special staff functions including operational control of all transportation.[2] Operational functions were generally limited in practice to motor transportation operation, although in several instances, railroad operation was included.[1] The concept of traffic control, however, provided for the co-ordination of all forms of transportation--by land, sea, and air.

SECTION 2

CONCLUSIONS AND RECOMMENDATIONS

5. Conclusions.

a. The continuance of the Transportation Corps, the use of which would require consideration in any future emergency, is amply justified. The Transportation Corps is necessary to provide the doctrine and policy essential to the mobilization and training of transportation troop units that will be required for the logistical support of large scale military operations in the future, and to provide a transportation service for the permanent peace-time military establishment, capable of expansion to meet emergency needs.

b. A complete transportation service was shown to have been necessary, although the details of its organization required modification and amplification as the campaign progressed.

c. The operations of the Transportation Corps in the European Theater of Operations were restricted by the limitations imposed by the relatively insecure "technical control" provisions arising from the policy of decentralization to which the United States Army in the European Theater of Operations was committed.

d. There was no provision within authorized Tables of Organization and Equipment for staff organization and troop units of the Transportation Corps in the field forces.

6. Recommendations. It is recommended that:

a. The Transportation Corps be established as a permanent statutory service of the War Department.

b. It include the planning and administrative branches, and operational services, concerned with railways, motor transport, water and inland waterways, and such other services as are required to meet transportation responsibilities.

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2. Interview with Colonel I. W. Littel, then Transportation Officer, Seventh U.S. Army.

3. Operational History, Advanced Section, Communications Zone.

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CHAPTER 2

ORGANIZATION FOR OPERATIONS

SECTION 1

THE ORGANIZATION OF THE TRANSPORTATION CORPS

7. General.

a. The organization of the Transportation Corps in the European Theater of Operations provided a staff for planning and administrative functions, and troop units to accomplish its mission. The staff included sections for operational planning, movements planning, and the administration of the headquarters of the Chief of the Transportation Corps, the principal function of the latter being personnel procurement, training, and assignment. The Headquarters also included staff sections for the technical supervision and the supply of the various transportation services; these in turn had planning functions in connection with requirements, tentative allocations of troop units and facilities, standing operating procedures and field maintenance policies, as well as technical field inspection and reconnaissance. They supplied also the necessary specialized information for the use of the over-all planning echelons.

b. The troop units for which Tables of Organization and Equipment existed, which were supplied and incorporated into the Transportation Corps in accordance with planned requirements, included marine operations, motor transport, military railway, traffic regulating, and staging area units. These provided for the operation of the functions for which the Transportation Corps was responsible. No provision was made for an Air Transportation Service. The probability of extensive re-supply by air was anticipated in operational planning; but this was not at the time an immediate concern of the Transportation Corps, since co-ordination was to be obtained through the Assistant Chief of Staff, G-4, Communications Zone, and the Combined Air Transport Organization.[2] It was not until relatively late in the campaign that movement control functions were delegated to the Transportation Corps for the purpose of co-ordinating air transportation with ground activities.

c. Transportation staff sections were provided for each of the administrative area commands, designated as Base Sections in the United Kingdom, with functions similar to those of the Service Commands of the Zone of the Interior. These Transportation Sections were responsible for the supervision of all Transportation Corps activities within their respective areas, each having control only of intra-sectional movement. The same provisions were made on the Continent, a Transportation Section being included in the Headquarters of each of the Sections of Communications Zone.

8. Movement Control Parallel to British.

a. For logistical purposes, the British War Office had subdivided the United Kingdom into Area Commands. Assigned to each of these commands were subordinate Headquarters of Movement Control Organization ("Q" Movements), which controlled all military movements within the United Kingdom. These subordinate Headquarters reported directly to, and were controlled by "Q" Movements, which was established on General Staff level. Each area command was divided into districts and local offices, each with its Movement Control Organization. Since it was essential to effect the maximum co-ordination with British

transportation agencies, it was planned to parallel the movements control functions of the United States Forces with those of the British, within the same geographical areas.

b. To accomplish this plan, the transportation officers normally charged with movement control in the six Base Sections established in the United Kingdom were designated as Regional Transportation Officers, with areas of responsibility called "regions", coinciding with those of the British Area Commands. The regions coincided roughly with the American Base Sections. The regions were sub-divided into Districts, which were in turn divided into local offices, called Rail or Road Transportation Offices. These decentralized Movements Control offices regulated traffic throughout the United Kingdom for the United States Forces, with co-ordination as required between Districts and Base Section (Regions) through the next higher echelon. The Regional, District, and local offices were physically located in the same Headquarters as the British Movement Control offices, to effect the maximum co-ordination. The essential difference between British and United States Movement Control was that in the case of the British the command functions were within the Movement Control Organization, while in the American service command was within the Base Sections and Headquarters, Services of Supply, with transportation as a staff section for technical supervision only. In most cases, however, the broadest interpretation was given to technical supervision and a considerable degree of over-all control was possible, especially where movements were scheduled between the Base Sections or Regions.

9. Comments on Organization.

a. The organization of the Transportation Corps as it existed in the United Kingdom in November 1943, is shown in Chart I.[1] As established, it provided for the control of the then limited transportation organization in the European Theater of Operations and for the planning incident to both current and impending operations. As the number of its troop units increased and the sphere of its operations expanded, it became necessary to augment the strength of the Headquarters, with personnel drawn from Transportation Corps troop organizations, principally the Traffic Regulating Groups.

b. Operations subsequent to the invasion required further augmentation in personnel, because of the wide dispersion of activities over which the Headquarters exercised technical supervision. By 30 April 1945, the Office of the Chief of Transportation had a strength of 226 commissioned officers, five warrant officers, and 839 enlisted men, of whom 145 officers and 544 enlisted men were attached from other organizations,

c. The organization of the Transportation Corps in the European Theater of Operations remained substantially unchanged throughout the campaign.

SECTION 2

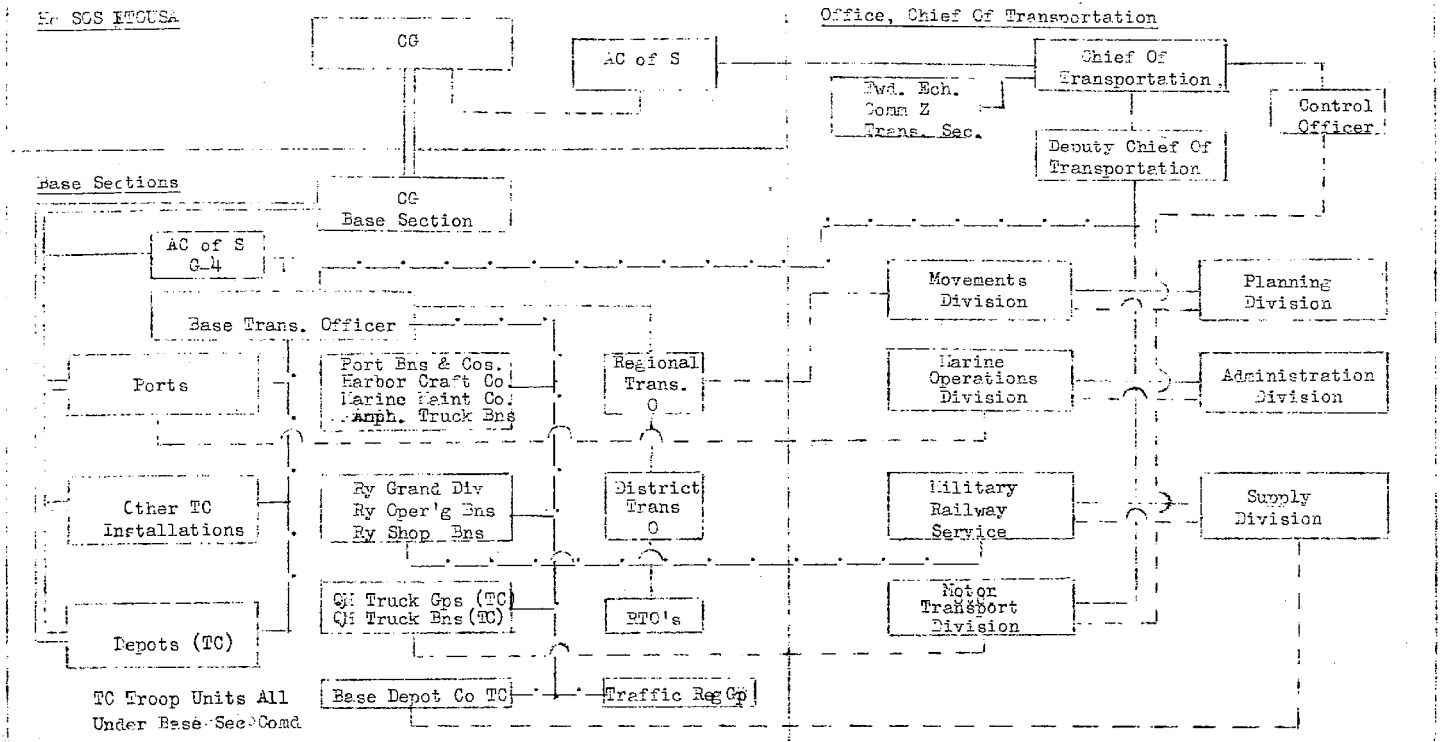
ORGANIZATION FOR OPERATION OVERLORD AND SUBSEQUENT OPERATIONS

10. Responsibilities of the Transportation Corps.

a. During the latter part of 1943 and the early part of 1944, with the earliest study of the "Overlord" plans for invasion of the Continent, came the necessity for detailed planning by the

Chart I — Organization Of The Transportation Corps In The United Kingdom — 1 November 1943

Key: Command | Staff Relationship | Technical Control | Technical Supervision



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Transportation Corps in connection with the logistical support of the invasion, including the closest scrutiny of the methods by which this support was to be provided and an appraisal of the troop requirements.[4] The Chief of Transportation was employed in an advisory capacity in the preparation of plans for the operations on the beaches, and he had the chief responsibility for the preparation of plans for the movement of supplies from the United Kingdom and later directly from the United States for the support of operations on the Continent.

b. There were three major problems confronting the Chief of Transportation, each of which required separate consideration. These concerned operations currently active or contemplated, as follows:

(1) "Bolero"--build-up of forces, equipment, and supplies.

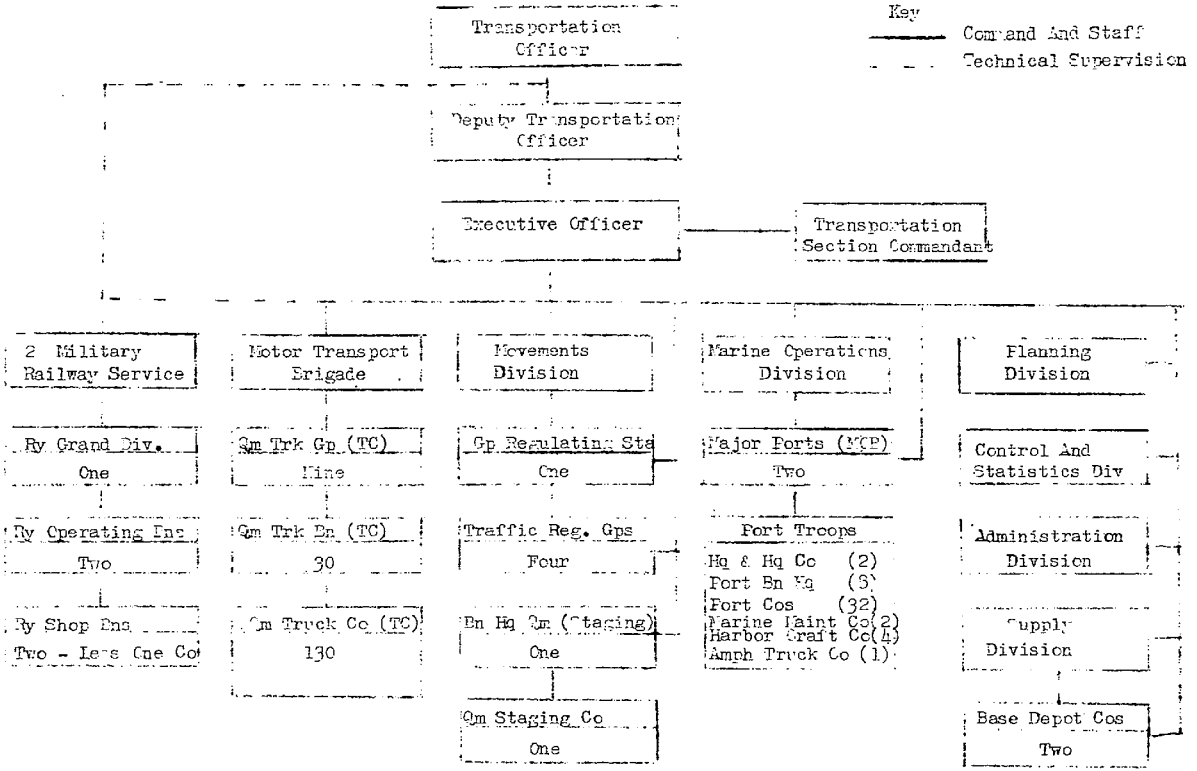
(2) "Overlord"--planning, United Kingdom phase, including out-loading of cargo and marshalling and embarking troops and equipment.

(3) "Overlord"--planning, Continental phase, including support of Operation "Neptune" (D to D + 41) and support of subsequent operations.

c. The Continental phase of "Overlord" involved three administrative groups, namely, Advanced Section, Communications Zone, Forward Echelon, Communications Zone, and finally the establishment of Communications Zone Headquarters on the Continent. The plan for the organization of the Transportation Corps was of necessity adapted to these requirements by the activation of Transportation Sections for each of the two advanced elements. The organization of these sections was planned to be substantially as shown in Chart I with the exception that the Advance Section and the Forward Echelon, Communications Zone, when operational, would become elements of the Communications Zone with area command responsibilities. This would permit the maximum of centralized control within their geographical boundaries. Since their responsibilities were vertical (from forward to rear), they constituted a single chain of command. The Transportation Officers were delegated command functions. As the situation developed, however, Forward Echelon, Communications Zone, was absorbed into the Communications Zone Headquarters, which moved to France about D+ 62 and hence never functioned as intended.

11. <u>Transportation Section, Advance Section, Communications Zone.</u>[2] Advance Section, Communications Zone, was a mobile Base Section having the same administrative and logistical functions, but in close contact with the Armies. It included a Transportation Section organized much the same as the Office of the Chief of Transportation, Communications Zone. The organization of this Section is shown in Chart II. The Transportation Officer of Advance Section was given command over all Transportation Corps troop units committed to the "Neptune" phase of operation "Overlord." After arrival of Headquarters, Communications Zone, on the Continent, the troop units under the command of the Transportation Officer reverted back to the control of Headquarters, Communications Zone, less those elements required for operations within the geographical boundaries of Advance Section. Chart III shows the effect of this plan. Not only had the troop units been absorbed, but also the plan of organization had been modified to place all operations under one head, including both movement control and transportation facilities. This organization had been used early in 1943 in the Office of the Chief of Transportation, Communications Zone, when the number of experienced officers was limited, and they had to be used to supervise the maximum number of staff groups. Between May, 1944, and March, 1945, the Advance Section suffered from a lack of

Chart II Organization of Transportation Section, Advance Section, Communications Zone May, 194[illegible]



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experienced personnel, since the release of functional services to Communications Zone installations carried with them the experienced branch chiefs.

12. Near Shore Planning for Transportation Organizations. Much of the ground work for the near-shore phase of planning was laid in the current operations of the Movements Division. The main problems involved were those concerning the orderly and expeditious movement of troops, equipment, and supplies from stations and depots to the embarkation areas. It was necessary to accomplish this with a minimum of disruption to parallel movements of British Forces, and the continuance of the incoming flow of personnel and material from the United States. To provide an agency responsible for this co-ordination, an Operational Branch of Movements Division was organized.[4] This new organization operated with British agencies to obtain convenient port facilities and transportation paths involving the least cross movement with British Forces'; depot facilities near the ports; and rail termini for the intransit storage of supplies, petroleum products, and ammunition; marshalling areas; concentration areas; and to provide a traffic regulating system, embarkation controls, and the pre-stowage of cargo for initial supply of the assault forces. It also issued Standing Operating Procedures to all concerned.

13. Co-ordination with British Agencies.

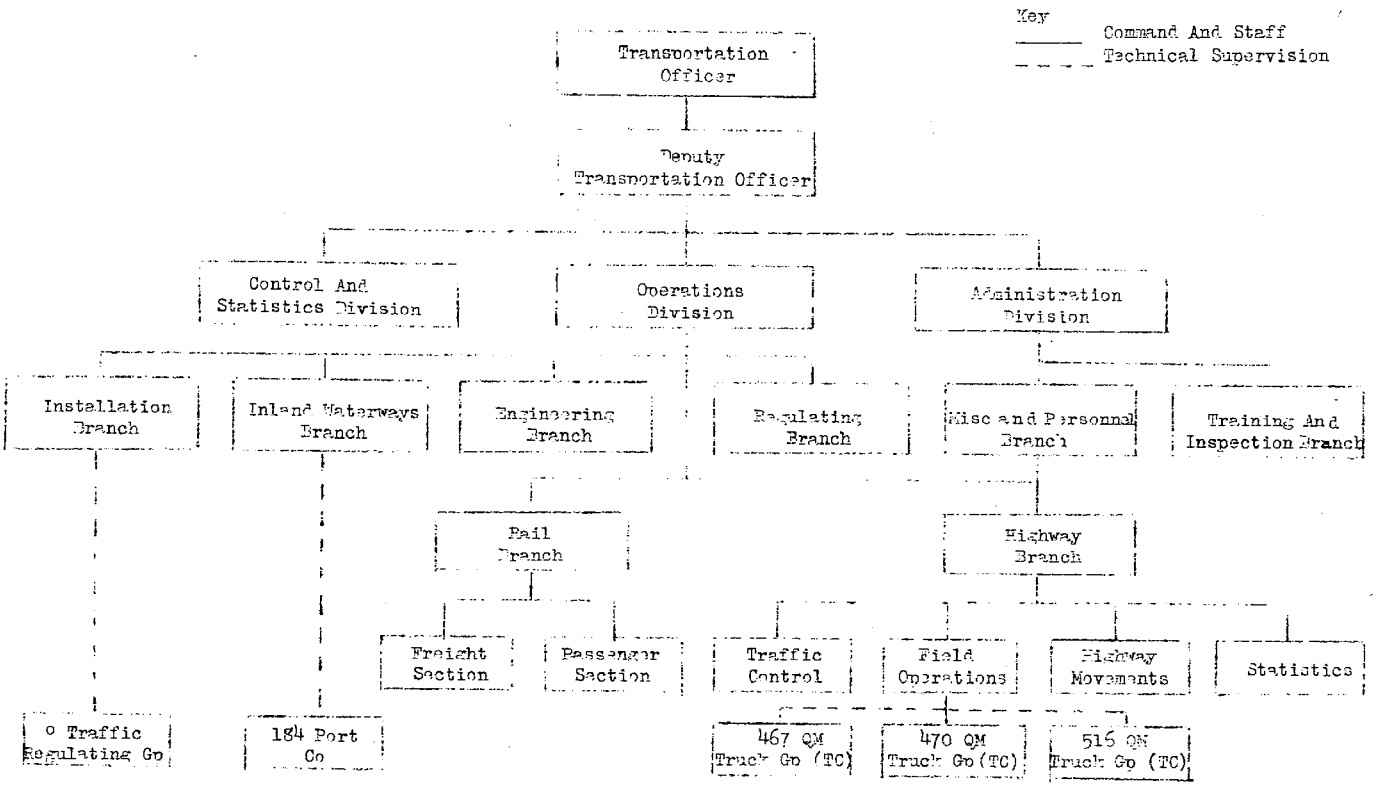
a. All activities of the Transportation Corps during the period in which the United States Forces were being assembled and moved within the United Kingdom required the maximum co-ordination with British military and civilian transportation agencies. All transportation within the United Kingdom was controlled by two principal organizations, namely, Movement Control Organization and the Ministry of War Transport. The former was responsible for all military movements within the United Kingdom and the latter for all civilian transportation, including rail, motor, and port facilities.

b. In addition to these two principal transportation agencies, were the War Office, the Admiralty, and the Royal Air Force. Transportation interests were closely allied with the Admiralty by reason of British responsibility for sea movements within Home waters, which included provision for convoy escorts in those waters, routing and diversion of shipping, maintaining radio communication with arriving convoys, and providing for their arrival within appropriate ports, while the Sea Transport branch of the Ministry of War Transport provided towage and berthing.

c. Liaison and co-ordination with these agencies were the responsibilities of the divisions of the Office of the Chief of Transportation, European Theater of Operations, and personnel of these divisions sat as members of the various committees for joint planning and operations. No separate staff branch was planned for liaison, as it was believed that those responsible for action were better able to discharge their responsibilities when information was passed directly to the users thereof.[1]

14. Transportation Section, Continental Advance Section. This organization was a development of the Continental Base Section that provided logistic support for the invasion of Southern France. The Continental Base Section became active on the Continent after the establishment of an area boundary by the Seventh Army on approximately D + 10, in much the same manner as the Advance Section, Communications Zone, European Theater of Operations. The plan for its organization was similar to that of Advance Section with command functions delegated to the Transportation Officer. The Transportation Section included

Chart III Organization Of Transportation Section, Advance Section, Communications Zone March, 1945



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branches for planning, movement control, rail, motor, water, and air. When the distance between Army rear boundary and Base Section became so extended as to make control and communications difficult, a further separation of Base Section functions became necessary. This was accomplished by the creation of an Advance Section and a Base Section. With the activation of Delta Base Section, responsibilities for marine activities were delegated to it. Thus, the Advance Section became responsible for forward area supply movement only, its functions being similar to that of an Advance Section, Communications Zone, as contemplated by FM 100-10, "Administration." The air branch had no command functions over operational aircraft (cargo, passenger, and liaison types), although it did control several liaison airplanes for Headquarters use only.

SECTION 3

ORGANIZATION OF THE OPERATIONAL SERVICES, TRANSPORTATION CORPS

15. General. The operational services of the Transportation Corps included the following:

a. Military Railway Service,
b. Motor Transport Service,
c. Marine Operations Division, and
d. Inland Waterways Division.

16. Military Railway Service.

a. Of these services, only the Military Railway Service existed prior to the "Overlord" planning period. All of its units, including staff level Headquarters, were authorized by approved Tables of Organization and Equipment. Field Manual 100-10 defined the duties of the Chief of Transportation, Communications Zone, as Director of Military Railways, and an appropriate staff section was provided in his office. The Military Railway Service was organized in accordance with approved Tables of Organization. The main subdivision of a Military Railway Service was a Railway Grand Division, which was located so that its jurisdiction generally included all of the area served by one Base Section. This plan was generally followed in both Southern and Northern France. No fixed allocation of troops to a Grand Division was made, but was based upon the mileage of track operated by it. It was generally found advisable to assign three railway operating battalions, one railway shop battalion, and one base depot company to each Grand Division. With these troops, a Grand Division was normally capable of operating from 250 to 450 miles of railroad under "Phase One" conditions, all operations being performed by military personnel. The original concept of the base depot company involved the storage and issue of all Transportation Corps equipment. Initially the Military Railway Service was the sole operational service, except for relatively minor requirements of the inland waterways system which might be operated as a function of Military Railway Services. With the growth of activity in other forms of transportation, it became obvious that supply requirements would necessitate a broader use of the base depot companies, and they were removed from the control of Military Railway Service and placed under the newly activated Supply Division.

b. Of the two Military Railway Services that eventually came under the jurisdiction of the European Theater of Operations, one was concerned initially with the support of operations in the Mediterranean area, and later Southern France. The other was active in the United Kingdom during the "Overlord" planning period, and

supported Continental operations incident to "Overlord." Both of these became the responsibility of the Chief of Transportation, Communications Zone, European Theater of Operations, late in November, 1944, with the activation of Southern Line of Communications, European Theater of Operations, which had assumed in Southern France the logistical functions which were formerly the responsibility of Headquarters, Mediterranean Theater of Operations.

c. With the junction between the Armies effected, and the assumption of over-all logistical support by Communications Zone, European Theater of Operations, it became necessary to co-ordinate the activities of both Military Railway Services. Prior to February, 1945, military railway units were under the command of the Sections of the Communications Zone in Northern France, with technical control and supervision vested in the Chief of Transportation, acting through the General Manager, Military Railway Service. In Southern France, prior to the same date, the Military Railway Service was an exempt activity, and its General Manager reported directly to the Commanding General.[6] This arrangement proved satisfactory for operation over a single line of communication and provided a maximum of centralized operational control of the railways, but did not materially improve co-ordination with other transportation agencies. In February, 1945, the two existing Military Railway Services were combined into a single Military Railway Service for the European Theater of Operations. By General Order, Headquarters, European Theater of Operations, delegated command functions to the Director General of Military Railway Services under the technical direction of the Chief of Transportation. A Provisional General Headquarters was authorized and activated. The Director General, Military Railway Service, was given command responsibility in all respects, except for courts martial jurisdiction, financial transactions, hospitalization, supply of items of common usage, and personnel accounting other than the assigning and re-assigning of personnel and organizations. All of these remained vested in the Sections of the Communications Zone. Experience proved that this type of organization was more suitable, and provided for the closer co-ordination required to meet the more complex requirements of Theater-wide operation.

17. Motor Transport Service.

a. During the planning period, the Motor Transport Service existed as a staff division of the Office, Chief of Transportation. Its mission included the accumulation of requirements, initiation of equipment studies, preparation of standing operating procedures and operational plans for employment of motor transportation, and the allocation of motor transport units to major commands. Planning was based on the retention of operational control by the Transportation Corps of all Communications Zone motor transportation, exclusive of those organic to units or organizations. In the United Kingdom, all motor transport units were under the command of the various Base Sections, with technical supervision by the Chief of Transportation. This condition led to some confusion where inter-sectional motor operation was required, and did not result in the most economical use.[5]

b. For Continental operations, however, long distance line-of-communication hauling was contemplated, and would require modification of the previous policy. The number of truck companies authorized had been reduced from the 240 estimated to be required to 160. Of this number, a portion was required for port clearance and static operations, and the balance for line of communications hauling. Therefore, to meet the requirements, a system of centralized control to insure the most economical use was needed.

c. Motor transport support was required for the two logistical elements responsible for supply activities within operation "Neptune." These elements were, first, the Engineer Special Brigades for the operation of the beaches and their clearance, and, second, the Advance Section, Communications Zone. In the belief that centralized control of motor transportation was necessary, Advance Section, Communications Zone, organized a provisional Motor Transport Brigade for the control of the truck units assigned to it. It was hastily organized shortly before D-Day. This unit did not control the truck units assigned to the beach brigades, nor those assigned for port clearance in Cherbourg (VO 1522), France, until late in August, 1944, and then only for a short period. At that time, Normandy Base Section was established, and Advance Section moved forward to the rear of the Armies.

d. The Motor Transport Division of the Office, Chief of Transportation, was re-designated the Motor Transport Service in mid-August, 1944, with its original mission of co-ordinating inter-sectional truck movement unchanged. Shortly thereafter, the "Red Ball Express" operation was initiated, and truck units were drawn from Normandy Base Section to reinforce the Motor Transport Brigade. This brigade was responsible for the field control of the truck units, and Normandy Base Section was responsible for movement control. The authority of the Motor Transport Brigade extended only within Advance Section boundaries, and this created difficulties as to jurisdiction over its companies when operating within the Normandy Base Section.

e. In November, 1944, a Provisional Motor Transport Service under the technical supervision of the Chief of Transportation, was authorized by Headquarters, Communications Zone, for the control of inter-sectional motor movement,[5,7] and the Motor Transport Brigade was de-activated. Efforts were made to obtain from the War Department a special Table of Organization for the new headquarters, but the matter was referred back to the European Theater of Operations as a matter of Theater concern only, on the grounds that the operational control of motor transportation was vested in the Transportation Corps only in the European Theater of Operations. This situation was unchanged at the conclusion of hostilities, although negotiations had been continued. A proposed Table of Organization for a Highway Transport Service (the War Department's title for a Motor Transport Service) was under study by the War Department, and was referred to the European Theater of Operations for comment. A Table of Organization was finally published on 7 May 1945, but did not reach the European Theater of Operations until after hostilities had ceased.

f. In general, the difficulties encountered in the organization of the Motor Transport Service were the product of shortage in the number of truck companies authorized and the policy of decentralizing command of motor transportation units. Shortage of truck companies meant that the capacity necessary to accomplish long distance hauls was obtained at the expense of the Sections of Communications Zone. This reduced their capacity for port clearance and static operations, to which they strenuously objected. The decentralization of the command of motor transport units, such command being vested in the Sections of the Communications Zone rather than in the Chief of Transportation, meant that difficulties arose in practice when it became necessary to divert truck capacity to meet changing requirements, and that uniform operating and maintenance policies were not prescribed.

18. Marine Operations Division.[8] Marine Operations Division was originally organized as a branch of Movements Division, since most of its activities in the United Kingdom prior to "Overlord" planning involved movement problems only. Its principal concerns were the diver-

sion of shipping and provision for the unloading of ships. The establishment and operation of ports of debarkation in France, however, required a broader approach to marine and port operations than had been the case previously, and a Division of the Office, Chief of Transportation, was activated to implement these plans. Under the policy of decentralization, the ports of debarkation were under the command of the Sections of the Communications Zone, with technical supervision vested in the Chief of Transportation. The diversion of shipping, co-ordination with naval authorities, and the implementation of supply movement programs are best controlled through a single agency. It was recognized in the early stages of operation in the Zone of the Interior that activities of the ports could best be controlled from a central Headquarters, and by War Department order, which affected the Zone of Interior only, all ports of embarkation were made exempt activities. In the European Theater of Operations, however, the Chief of Transportation exercised only technical supervision, but sufficient authority was delegated by the Commanding General, Communications Zone, so that a form of exempt activity was possible.

19. Inland Waterways Division.[9] The operation of inland waterways was the responsibility of the Chief of Transportation. In the "Overlord" planning little attention was given to operation of inland waterways, as it was generally believed that enemy demolitions would be so thoroughly executed that little use could be made of this form of transportation. In fact, this was the case, and, except for the Seine River, very little inland water traffic was possible up to November, 1944. After that date, much more use was made of this facility. Early in November, 1944, an Inland Waterways Division was organized in the Office, Chief of Transportation. Its principal mission was the transportation of coal to Paris (VS 0544) via the Seine River from Le Havre (VL 4027) and Rouen (VN 2817). It was also directed to open up all river and canal traffic as soon as possible to serve military needs. It was planned that local offices would be opened as each geographical area became operational. Soon after the reconnaissance was completed the first Belgian area office was opened at Brussels (VJ 6355). In order to effect co-ordination with Allied governments a liaison section was included which was particularly important in view of the joint responsibilities of the French and Belgian governments and civilian agencies. Since in all cases, the operation of inland waterways could not begin until the Armies had passed well forward, it was not deemed necessary to use military personnel for other than supervisory activities.

20. Air Transportation.

a. During "Overlord" planning, the possibility of air supply and evacuation was considered for critical supply requirements. It was to be controlled by the Armies and accomplished by Army Air Force equipment and personnel. Co-ordination was through the Assistant Chief of Staff, G -4, Communications Zone, and Combined Air Transportation Operations Room, a joint British-American air transport control organization. In the Third and Seventh Armies and the Continental Advance Section the Air Movements Officer was an important member of the Transportation Officer's staff.[2] It was later found desirable to delegate Air Movement Control in the Communications Zone to the Transportation Corps in a similar manner.

b. The arrangements for initial logistical support by the Air Forces were not well co-ordinated prior to the invasion of Northern France.[10] It was not until extensive requirements for supplying the Third Army during August, 1944, necessitated such action that a satisfactory degree of co-ordination was achieved. In Southern France

similar operations were more successful even in the early stages of the campaign. The necessity for reserving a considerable portion of the available transport type aircraft for airborne offensive operations was one of the reasons for the small scale use of aircraft in the movement of supplies. This condition could have been remedied by the establishment of an Air Transportation Service as a part of the Transportation Corps operating its own organic aircraft. Under this plan, the Army Air Forces would supply aircraft, crews, and maintenance personnel and the accompanying plant, under the administrative command and operational control of trained air transportation officers of the Transportation Corps. A precedent for such combined activities existed in the operational control by the Transportation Corps of vessels of the War Shipping Administration, chartered by the War Department. The vessels were maintained and supplied with crews, fuel, and provisions by the War Shipping Administration, but operated by the Water Division of the Transportation Corps. In May, 1944, about 2,000,000 net tons of cargo capacity were under the direct control of the Transportation Corps, equalling about 200 cargo ships. Experienced steamship executives and operational personnel, drawn from civilian occupations, were used by the Transportation Corps in its maritime activities. There is no reason to believe that a similar plan could not be provided for the operation of an Air Transportation service, and suitable experts could be recruited from civilian occupations to operate it.

SECTION 4

PERSONNEL PROBLEMS

21. Placement of Officers.[11] In order to utilize the comparatively small number of experienced military personnel, a considerable degree of skill was required in the placement of personnel assigned to the Transportation Corps. In almost every instance, it was necessary to make the maximum use of civilian background, rather than that of military experience. This was later to cause considerable trouble, especially in the cases when:

a. Troop command functions were exercised;

b. Military administrative experience was required;

c. Military necessity demanded action unprecedented in civilian practice, as in personal safety measures;

d. Estimating performance when time, distance, and terrain were factors;

e. A knowledge of military terminology and materiel was required; and

f. The use of expedients without major shop facilities was necessary.

22. Diversion of Officer Personnel to Form other Headquarters. Another problem of major importance concerned the formation of the various headquarters and organizations necessitated by the rapid expansion of the functions of the Transportation Corps. This involved the release of Headquarters personnel and their assignment to subordinate Headquarters for both staff and operational duties. The first major diversion of personnel was made to staff the Forward Echelon of Communications Zone, during the planning for operation "Overlord". Simultaneously, the Advance Section, Communications Zone required some reinforcement. Those requirements arose during the time that the volume

of inbound traffic in personnel, vehicles, and cargo was increasing. The number of Regular Army Officers on duty with the Transportation Corps in the European Theater of Operations was limited, at no time exceeding 30, and only a small number of Reserve Officers were available. Together, these represented 5 per cent of the number of commissioned officers of the Transportation Corps in the European Theater of Operations during peak operations.[2] Thus, the lack of trained military Transportation Corps personnel, by reason of its previous non-existance, caused a tremendous burden on the few experienced officers available. The experts commissioned directly from civilian life, had to be indoctrinated; schooled in the rudiments of logistics, military terminology, and identification of material; and taught what few precedents had been established in the short life of the Transportation Corps, principally those of the North African and Italian operations.

23. Civilian Personnel in Marine Operations.[9]

a. Another problem of major importance was the use of civilian technicians and other employees for the operation of floating equipment. With the delivery of the first sea-going towboats, it appeared that a considerably higher degree of skill would be required for their efficient operation than was possessed by the Harbor Craft Company personnel then in the European Theater of Operations. In order to insure that the tugs would be operational, during the critical build-up period when a considerable amount of coast-wise towing was necessary, it was decided to employ civilians until such time as military crews could be trained. The number of civilian employees grew as each harbor craft convoy arrived, until the total reached nearly 3000 men during peak operations. In addition to tugs, they also manned the small tankers operating between the United Kingdom and the far shore and in the Seine River shuttle service, and several small aircraft carriers (non-tactical) and troop ferries.

b. The presence of civilians, paid on a considerably higher wage scale than soldiers while performing the same type of work, was not conducive to good feeling. The lack of discipline on the part of the civilian sailors was noticeable, and existing practice tended towards leniency in this respect, while there was no such let-down on the military side. Much of the disciplinary trouble stemmed from the fact that the recruiting of this personnel was accomplished in competition with United States Maritime Service, which had made a continuing effort to obtain crews for the ever expanding merchant fleet. Too critical screening would have excluded a large percentage of the men who were successfully employed in the European Theater of Operations. It should be recalled that the maritime trades could obtain draft deferment if employed at sea. The more skilled men were absorbed in the Merchant Marine, and the less skilled gravitated to the Water Division, Transportation Corps. Out of this group it was necessary to obtain the deck and engineer officers as well as the "hands," and, in a great many cases, previous ratings which would receive little or no immediate recognition in the Maritime Service made their owners the equivalent of First and Second Officers in the Transportation Corps. The creation of simulated field grade rank for the equivalent of licensed officers of medium size harbor craft, was a source of annoyance to company grade Army officers performing similar duties. Unarthorized wearing of naval insignia was a constant source of aggravation to both military and naval personnel, until early in 1945 when civilians were required to wear insignia indicating their true status. In all, there was a general resentment toward the use of civilians in a combat zone. On the credit side was the fact that the towage programs were accomplished. Many of the small tugs operating on the far shore during the actual invasion period were manned by

civilian crews, some of which sustained casualties and were the recipients of high commendation from the naval command. In small tanker shuttle operation in the Seine River, an average of about 16,000 ton miles of critical petroleum products per vessel per day was attained, the equivalent of a 2000 gallon tank truck company operating at a high rate of performance, and one vessel consistently averaged 26,000 ton miles a day. Another phase of the civilian personnel procurement program involved the recruitment of civilian stevedores, dock superintendents, and crane operators. As might be expected, this class of work would draw on the age brackets well above the average military age and the men were of a more settled "family" type, a good many of whom were drawn from Zone of Interior ports of embarkation. This may serve to explain the generally unsatisfactory performance in Antwerp, where discharging of cargo was of great importance since between 50 and 60 ships were working simultaneously. It was reported that when subjected to V-weapon attack, they suddenly became aware of family responsibilities, and their performance fell off considerably, so much so that the Port Commander requested and directed their release.[9] The same situation obtained in the case of the crane crews, which were replaced by soldier operators with an immediate and noticeable improvement, particularly in maintenance. These workers were transferred to ports not so directly under attack, where their services were satisfactory.

24. Additional Drivers for Motor Transport Service. When the Transportation Corps assumed operational control of Quartermaster truck units, it was expected that the flow of trained replacements, both in officer and enlisted categories, would be automatic. Such was not the case, and Quartermaster replacements went to Quartermaster units, since their driver and officer requirements still existed, and the replacements were of course welcome and necessary.[5] This condition, however, was a serious one, since the Transportation Corps had based its estimates of motor transport requirements on 24-hour operation, using two drivers per vehicle. The original request for driver augmentation was made in the fall of 1943. After considerable discussion, it was agreed to supply 40 additional drivers for each of the 141 companies then in the European Theater of Operations or enroute. The Commanding General, Communications Zone, recognizing the necessity for action, directed the transfer of the necessary personnel from troop units of the Services of Supply. The actual transfer was not completed until shortly before D-Day. Unfortunately, the calibre of the personnel thus obtained was considerably below standard. Relatively few of the men were trained truck drivers, and only a few of these competent to handle truck trailer combinations. Time did not permit their training to minimize these deficiencies. Shortages in heavy equipment due to operational needs required on-the-spot training, which had to be continued on the Continent. The delay in furnishing the extra drivers contributed to deficiencies in early operations, particularly in vehicle maintenance.

25. Railway Operations Officers. In the knowledge that much of the success in rail operations would depend on the rapidity with which military cargoes could be forwarded through classification yards, the Chief of Transportation in an urgent radio communication to the War Department requested the services of 50 experienced yard operators, switch men, yardmasters, and superintendents.[12] While the request was handled promptly and the civilian experts flown to the European Theater of Operations within a remarkably short time, the problem of military indoctrination was present. It was specified that these experts have military background if possible, and many actually had such experience, either in the Reserve organized on the major railroads while under the jurisdiction of the Corps of Engineers, or experience in World War I, or both. These men, however, were handicapped by reason of lack of

knowledge of pre-planning and current logistical problems and it was some time before their services reached the full potential.

SECTION 5

CONCLUSIONS AND RECOMMENDATIONS

26. Conclusions.

a. The Movement Control organization of the British Army provided a satisfactory method for the control of military movement, and the movement control organization of the United States Forces was patterned after it.

b. Under the policies dictated by the Theater Commander, co-operation between United States and British Forces was highly satisfactory. The extensive application of the policy of joint United States-British staff operations was extremely helpful in transportation planning and movement activities.

c. The plan of organization was adequate, but it was necessary to augment the personnel of Headquarters.

d. The concept of the Operational services of the Transportation Corps, as they were to be used in support of operations, was generally sound.

e. There was no provision for the control of air transportation by the Transportation Corps. This was the only form of transportation employed in logistical missions that was not under the technical supervision of the Chief of Transportation, except for purposes of co-ordinating ground activities with air transportation.

f. The Transportation Corps had no priorities for the procurement of operating and supervisory military personnel, including truck-trailer drivers, marine engineers, tow-boat pilots and deck hands, operators of large cranes, locomotive crews, yard-masters, switchmen, signal tower operators, and train dispatchers.

g. Lack of military personnel trained in transportation resulted from the prior non-existence of a Transportation Corps.

h. There were many instances of lack of trained reinforcements to fill key positions and to provide for expansion to meet current military needs.

i. Much time was lost in the training of civilian experts in an appreciation of the military aspects of transportation.

j. The services of civilians in the operation of coast-wise and harbor craft, and large floating cranes, was reasonably satisfactory. There were, however, some indications of laxity in screening, and an apparent lack of understanding on the part of some of the civilian employees that they would be employed in areas subject to enemy attack. For one or the other of these reasons, the services of a small portion of this personnel were unsatisfactory. The employment of civilian personnel was necessary because of the lack of sufficient trained military personnel during early operations.

27. Recommendations. It is recommended that:

a. The Command and General Staff and special Service Schools,

and the United States Military Academy, incorporate the study of Transportation Corps doctrine, policy, procedure, and technique in their curricula.

b. An adequate reserve component of civilian transportation personnel, both enlisted and commissioned, be established and maintained, and that provision be made for participation in active training as frequently as appropriations will allow.

c. A sufficient number of all types of troop units of the operational services of the Transportation Corps be retained in the peace-time military establishment, for use in training reserve components, exclusive of other than the necessary command and staff headquarters organizations.

d. The policies providing for the use of civilian personnel in transportation operations be reviewed for the purpose of minimizing deficiencies observed in the European Theater of Operations.

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PART TWO

OPERATIONS, SERVICES, AND SUPPLY OF THE TRANSPORTATION CORPS

CHAPTER 1

PLANS FOR OPERATION "OVERLORD"

SECTION 1

PLANS FOR OPERATION "OVERLORD"

28. Immediate Transportation Requirements, "Neptune" Phase.

a. The Transportation Corps was charged with responsibilities incident to the assembly, concentration, and embarkation of troops and organizational equipment on the near shore (England), and supervision of the loading of the craft scheduled to constitute floating base depots during the assault period. Far shore (Normandy) operations were the responsibility of the First Army in the early phase, with normal Transportation Corps functions being performed by the Engineer Special Brigades, including the operation of the beaches (comparable to normal port operations), and motor transportation. It was provided that one Headquarters, Major Port (Mobile), with attached port troops, was to reinforce the Engineer Special Brigades scheduled for the operation of Omaha Beach area. Rail activities were to be confined to reconnaissance of railroads uncovered by the advance of the Armies.[1]

b. It had been determined that United States Forces would be embarked on the south-west coast of England through the four port areas of Falmouth (VX 2355), Plymouth (VX 9073), Dartmouth (VY 3071), and Weymouth (VZ 1099). These ports were to be used for landing craft and the embarkation of personnel and vehicles. The support operation was to be embarked in the Bristol Channel ports in order to provide a minimum of confusion in the cross flow of troops and vehicles in an already over-crowded area. The build-up phase which was to constitute the major supply movement, was scheduled from Plymouth and Southampton (VZ 8533), the latter port to be used jointly by British and American Forces. For the assault and support phases, troops and vehicles were assigned to craft in order to facilitate the drawing up of embarkation tables. The build-up phase did not require craft allocation and it was planned that vessels employed in this operation were expected to return to their home ports for reloading.

29. Traffic Regulation. In order to assure reasonable compliance with phasing tables which had been drawn up to regulate the flow of troops to the Continent, a control agency designated as Build Up Control Organization (short title BUCO) was created for joint United States/British operations. The American branch of this organization, known as Buco West, was responsible for United States troops movements. Priorities of troop movement, once established, could only be changed on the authority of the First Army Commander, until he was superseded in command by the Commanding General, 12 United States Army Group (later designated as 12 Army Group). For the control of craft used in the operation and their expeditious turn-around, a joint traffic control agency was established, designated as Turn Around Control, which was staffed by British Naval personnel with liaison officers from the United States Navy. It was

the mission of this agency to expedite the turn around of all craft used in the operation, and to pass information relative to vessel return movement to the Transportation Corps. Movement Control Organization and the British Ministry of War Transport were involved in the control of movement from the assembly and concentration areas, and the depots and in-transit depots designated to support Continental operations. A further control agency under the Admiralty was set up to control the use and operations of all towing craft to be employed. This agency was designated as Tug Control. In all of the above, United States and British agencies were represented.

30. Naval Participation. Naval responsibilities included operation of landing craft, convoy routing and escort, harbor clearance and control, naval ferry craft operating during the beach phase, the regulations governing Army operated ferry craft as to marine safety, salvage, marine repair, shipping diversion, and berthing as required by the Army.

31. Plans for Movement of Troops and Organic Equipment to Embarkation Areas.

a. The Operational Branch of Movements Division prepared a manual (called "Preparation for Overseas Movement--Short Sea Voyage"), setting up the procedures governing embarkation of troops and equipment and the movement of supplies from depot installations to embarkation areas. The plans for the movement of troops, as prescribed by this manual, were as follows:

(1) Units would move from home stations to concentration areas where they would leave excess vehicles and equipment. Troops in concentration areas would be on a six-hour alert basis.

(2) Troops would move from the concentration areas to the marshalling areas where they would be assigned to specific landing craft and would water-proof their vehicles. Upon arrival in the marshalling areas, troops were to clear through Road Control Regulating Points. Personnel assigned to specific craft were ordered to definite bivouac areas. It was not contemplated that troops would remain in marshalling areas in excess of 24 hours.

(3) Upon arrival at embarkation areas, troops were to be moved and embarked on craft without delay. A Sector Headquarters, at which were represented the Force Commander, the Navy, the Transportation Corps, and other services, advised when craft parties should move, and notified Road Control Regulating Points so that craft parties could be moved expeditiously. By this arrangement it was possible for the Regulating Point to schedule departures of craft parties so as to avoid confusion. Marshalling areas were not supposed to exceed 75 per cent of their planned capacity, so that possible errors in troop movements would not find the marshalling

areas too crowded. All movement from home station to embarkation areas was under the control of Build Up Control West and troops were moved only as they appeared on the phasing table.

b. The manual also included detailed instructions regarding the movement of material from depots. Requisitions from Army were submitted to depots through the responsible issuing Service. The Services allocated definite amounts by lots to the various depots in the United Kingdom. Material was prepared for shipment and the Transportation Corps was advised as to shipping instructions. Arrangements were made with the railroads to move the supplies to the ports as they were called for by the Task Force Commander, and the Rail Transportation Officer at the depots regulated the movement. Shipping programs were prepared and issued by the Transportation Corps based on the phased requirements of the Services as prepared by co-ordinating committees from First United States Army Planning Group and the Supply Service.

32. Shipping Program.[3]

a. Supplies were scheduled for pre-loading to maintain the Armies during the critical phase of the assault operations.[19] The shipping schedule for this program included 54 Liberty ships and approximately 390 British coasters, ranging in size from 500 to about 2000 tons deadweight capacity. The schedule for outloading required approximately 70,000 tons of cargo pre-loaded and available for use on D + 1. Complete schedules were prepared relative to the movement of this fleet. In addition, approximately 11,000 tons of ammunition, rations, and packaged petroleum products were to be loaded on barges. The plan contemplated the beaching of these barges, thereby establishing a depot for supplies for which a high rate of expenditure might be expected and also as insurance against weather interference with the unloading of ships.

b. Marine Operations Division of the Office of the Chief of Transportation was charged with the port operations incident to the pre-loading programs. For subsequent support, a program of commodity loaded ocean-going vessels of the Liberty type to come directly from the United States was planned. Commodity loading presents the easiest form of cargo preparation for expeditious unloading where adequate sorting facilities are available. It would also be possible to call forward ships with complete knowledge of the contents, thus simplifying supply. Available for this operation were approximately 220 Liberty ships operating on approximately a 50-day turn-around.

33. Documentation of Supply Shipments.

a. A simple form of documentation had been planned to assist in the prompt movement of depot stocks to ports of embarkation. This document, called the Depot Supply Shipping Data form (generally known as the "Dizzy Dee"), was prepared by the depots and sent to the Transportation Corps as a descriptive notice of availability of cargo for movement. When the movement was scheduled, copies of the "Dizzy Dee" and way bills were forwarded to the ports. By this means, ports were advised as to shipments en route and were able to identify cars, contents and destination.

b. The same general plan was proposed for use on the far shore. It was anticipated that the time interval between arrival of documentation and cargoes might be such that pre-planned movement from ports to depots would be delayed, by reason of the

failure of ships' manifests to arrive in sufficient time for expeditious clearance of goods from the ports or beaches. In view of the characteristics of weather in the English Channel, air courier or fast boat service was mandatory, until signal communication could be provided for the transmission of cargo information and sailing cables. In order to minimize the difficulty arising from the delay in arrival of manifests it was planned to make shipment forecasts for a definite period of days which would make possible a coarse allotment to depots and dumps. This system would aid the Services, but would be of little help to the ports without specific information as to the cargo carried by each ship. The pre-stowed ships, in theory, offered no problems in this respect since documentation existed prior to departure for the Continent. In practice, however, the changing requirements up to the day prior to invasion had the effect of delaying final documentation, so that early beach operations were hampered by lack of knowledge of "what cargo was in which ship"—particularly in the pre-stowed ships. This was a serious problem only with reference to some types of Ordnance material that, by reason of considerably higher rates of expenditure than was anticipated, became in short supply.

34. Transportation Troop Forecast.[1] Plans drawn by Advance Section, Communications Zone, determined the initial Transportation Corps troop requirement. For the operation of the Transportation Corps it was planned that in the period D to D + 41 approximately 33,500 Transportation Corps troops would be available on the Continent, including its forward Headquarters; 121 Truck Companies with appropriate group and battalion Headquarters; two Headquarters, Major Ports (Mobile); 32 Port Companies with seven Battalion Headquarters; three Traffic Regulating Groups; one Amphibian Truck Company; two Harbor Craft and one Maintenance Company; one Railway Grand Division; two Railway Operating Battalions; one Railway Shop Battalion; and three Base Depot Companies. The troops and their equipment were phased to arrive in the proportion of 66 per cent prior to D + 25, and 100 per cent by D + 41, based on the forecast strength of the Army on the Continent at the time.

SECTION 2

CONCLUSIONS AND RECOMMENDATIONS

35. Conclusions.

a. Transportation Corps responsibility as planned for Operation "Neptune" was concerned initially with logistical support from within the United Kingdom, to include the control and supervision of embarkation procedure and the loading of shipping with supplies for the assault forces, and subsequently, the transportation requirements for operational activities of Communications Zone on the Continent.

b. At the time during which "Overlord" plans were in preparation, the Transportation Corps was generally considered to be a Communications Zone agency. With the development of the plans, however, Transportation Corps functions were provided in the field forces, including use of its troop units in tactical operation.

c. The planning and responsibilities of the Transportation Corps were discharged in a commendable manner, as indicated by the relatively orderly way in which the largest amphibious operation ever mounted was embarked under combat conditions. The early preparation of the detailed standing operating instructions that applied to the embarkation was indicative of full appreciation of

the requirements for such an operation.

d. The usefulness of closely supervised and policed movement control for major troop movements was established beyond question. This applied with equal force to the internal movement of all personnel and equipment as typified by the activities of Movement Control Organization, regulation of priority of troop movement as controlled by Build-Up Control Organization (West), and actual overseas traffic control by Turn-Around Control Organization. All of these agencies, then jointly operated by the United States and British Forces—naval and ground—are worthy of further study and consideration for application in future requirements. That the necessity for such agencies existed is unquestioned. Their operation was basically the same as contemplated by the movement control agencies of the Transportation Corps.

e. Naval planning activities concerning the logistical support of the Armies was adequate and effective.

f. The pre-loading plan and its implementation was effective particularly in the provision for beach reserves in the form of barges pre-loaded with items of supply for which a high rate of expenditure might be expected.

g. Commodity loading, with normal discharge for later detailed sorting, was most effective, fully justifying its planned use.

h. Documentation to be used in the movement of cargo from depots in the United Kingdom, and thence by water to the Continent was relatively simple. In practice, deficiencies developed principally because of difficulty in transmitting information across the English Channel in sufficient time to permit allocation of cargoes to the beach area dumps, before the arrival of the cargoes themselves. These difficulties were greatly reduced when adequate signal communication for the transmission of information was provided.

36. Recommendations. It is recommended that:

a. Transportation Corps doctrine include both tactical and non-tactical operations, in support of both Communications Zone and field forces.

b. The same degree of centralized and supervised traffic and movement control exercised in mounting operation "Neptune" (within "Overlord") be considered for general application to all military movement control.

c. Joint studies be continued with the Navy toward further improving combined operations, involving logistical support of ground forces, with emphasis on port and beach operations.

d. The maximum use of commodity loading be considered in operational planning doctrine of the Transportation Corps.

e. The study of forms of documentation be continued in order to improve them and to provide for the widest application.

f. The General and Special staff schools include intensive study in transportation planning as applied to all types of operations.

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CHAPTER 2

MARINE AND PORT OPERATIONS

SECTION 1

BEACH PHASE, OPERATION "OVERLORD"

37. Transportation Plan. During the beach phase, the mission of the Transportation Section of Advance Section, Communications Zone, included operation of the ports of Cherbourg (VO 1522), Barfleur (VO 3026), Granville (VT 1134), and later St. Malo (VS 7814); operation of the railroads; traffic control on highways; transportation of supplies from ports and beaches to Army and Advance Section depots and units; and the establishment of a traffic regulating system to control supply flow at Army rear boundary. These responsibilities were to begin at about D + 25.

38. Berthing of Ships. During the period of Army control, Transportation Corps responsibility was limited to near shore operations only. These responsibilities included furnishing stowage data to the far shore by radio. Build-up Control West was responsible for forwarding identification of departing ships, and their sailing time. This information was passed to the naval command on the far shore, and to the Engineer Special Brigades for locating, berthing, and subsequently, unloading the ships. This information was transmitted by airplane courier and/or fast boat. The lack of adequate advance notice of arrival, by failure of the airplanes to get through or because of weather interference with the courier boats, caused considerable confusion, so that boarding was necessary to obtain accurate information as to the cargo carried in the ships. The subsequent provision for radio communication between the off shore naval control craft and the Beach Headquarters, made it possible to identify craft on arrival at the control point, off shore, and to make arrangements for berthing. Since cargo identification and vessel information was already available through radio advice from the near shore, part of the earlier difficulties were solved. The added communications system, however, was not timely enough to prevent a very considerable accumulation of shipping off the beaches. [2]

39. Unloading of Ships.

a. Pre-loading was intended to provide for selective discharge based on Army requirements. It was considered that some additional provision for selective cargo would be necessary, and special shipments of specific items were made by three different methods, namely: air shipment, in accordance with standard precedure established for that purpose; the Greenlight project under which 600 tons of Engineer (or Ordnance Class V, on 24-hour notice) was shipped per day by fast water transportation; and the Water Red Ball Project, which was similar to the Greenlight Project.

b. The confusion resulting from failure (in the earlier stages of operations) to identify shipping upon arrival, caused a substantial back-log of shipping off the beaches. Attempts to unload these vessels by item resulted in further congestion to the point where it became urgent that, unless changes were effected, the Armies could not be supported. [2] Shortage of cargo handling gear on ships pre-loaded in the United States in anticipation of quayside discharge further complicated discharging. Amplifying early difficulties, the Navy had not favorably considered "drying out" Landing Ships Tank, be-

cause of possibility of "hogging" damage due to ground inequalities on the beach. This meant that unless cargoes could be discharged on a favoring tide, only partial discharge was possible. The Navy, however, experimented with several vessels, and it was found that no damage was caused to the ships, and barring possible enemy action, the operation was relatively easy. Without delay, orders were issued directing "drying out" craft as required. [2]

40. Effect of the Storm of 19 - 22 June 1944. The artificial harbor, designated Mulberry A (an articulated, steel decked, floating pier), had been completed on 18 June 1944, and the first ships were unloaded. A severe storm, lasting over three days, so damaged the pier as to render it of no further use. During the period of the storm, critical shortages developed in small arms ammunition and medium artillery shells. It was due to this shortage that the beaching of coasters and Landing Ship Tanks was ordered. The performance of the Engineer Special Brigades and the Navy, together with the Transportation Corps units, in clearing the damage to permit resumption of full-scale operations immediately upon cessation of the storm, is a tribute to their skill, courage, and ingenuity.

41. Further Effects of Retarded Operations. Late in June and in July 1944, it became necessary to call forward all ammunition ships then at anchorages in the United Kingdom. Unprecedented expenditure of ammunition, by reason of hedge-row fighting and determined enemy resistance, was in excess of receipts. At the end of July, 1944, there were approximately 29 ammunition ships with a capacity in excess of 145,000 long tons, awaiting discharge off the beaches.

42. Opening of the Minor Ports. Transportation Corps port activities on the Continent actually began with the assignment of the 11 Port to the operation of Isigny (VT 5085) and Grandcamp (VT 5944). [3] Isigny began to receive cargoes on 24 June 1944 and Grandcamp on 25 July 1944. Reconnaissance had established that their receptive capacities could be maintained at about 1000 tons per day each, with an increase of 500 tons for Isigny, provided some dredging was done. By 31 July 1944, both ports had exceeded their estimated capacity intermittently, but the average performance was approximately 50 per cent of that predicted. Much of the difficulty arose from the lack of cargo handling equipment, the bulk of which had been landed on Utah Beach (instead of Omaha) and placed in other service depots. [4]

43. Lighterage by Amphibian Trucks ("DUKW's"). [1]

a. In the beach operations, ships were unloaded by lighters, including 2½-ton amphibian trucks (commonly known as "DUKW's"), barges (to a limited degree), and naval landing craft of the smaller types, principally Landing Craft Tank which was considered the most useful of all conventional types of ferry craft. The "DUKW's" were the most useful all-around carrier, since they were able to move the cargo directly from shipside to the dumps. It had not been planned to use them beyond the transfer points on the beaches, in order to realize their full usefulness, since their relatively low speed in the water required their immediate return to the water for hauling between ship and shore. Until the establishment of transfer points, operated by the Engineer Special Brigades and 11 Port, it was necessary for the "DUKW's" to carry their cargo directly to the dumps forward of the beaches. Transfer points were opened on Omaha Beach on about D + 7 and on Utah Beach on about D + 18. They consisted of unloading platforms with crane facilities, so that "DUKW's" entered in one lane, and trucks in a parallel lane on the other side, and the cargo was transferred either directly, or to the platform where it was sorted and transferred to trucks. Traffic regulations were strictly enforced, and surge pools of trucks

were maintained to provide for immediate transfer of cargo. Telephonic communication was maintained between the traffic control towers, truck pools, and transfer points to facilitate the dispatch of trucks.

b. "DUKW" operation was outstanding when the water-distance was not great. Pre-loaded "DUKW's" were discharged at the line of departure, some 15 miles off shore, in the D to D + 1 operations. More vehicles were lost by reason of swamping than from enemy fire, due to loss of control after their fuel was exhausted from maneuvering in the sea while awaiting an opportunity to land. The location of the fuel intake was such that re-fueling at sea would admit water with the gas.[1] In later operations, when the ships were able to come closer to the beach, the "DUKW" was the most important means of unloading all types of cargo, the size of which permitted its accommodation in the body of the vehicle. During the period D to D + 20, it was found that one "DUKW" Company with 50 per cent of its equipment operational could work six hatches continuously, if two round trips per hour could be made -- a rate of about 125 tons per hour. The average deadline for a "DUKW" Company varied from 20 per cent to almost 70 per cent at the end of beach operations in October and November, 1944, with an average of about 33 per cent for extended operations, provided spare parts and maintenance personnel were available to a reasonable degree.

c. One additional handicap in the operation of the "DUKW" was the lack of deck hands on the vehicles. For continuous operation, mooring at shipside required that the driver remain at his station to control the vehicle. After mooring, it was necessary to guide the sling loads into place, and the driver had to perform this duty also. Experience indicated that a minimum of two men is required to perform all of the work of the vehicle, and it was necessary to draw deckhands from port battalion hatch crews. This was an expedient that permitted continuous operation, but was only partially satisfactory.

44. Army-Navy Co-operation. The major support of the Navy was required during the beach operations to supply the ferry craft. This had been anticipated as part of the mission of the Navy. All types of Transportation Corps ferry craft then in the European Theater of Operations, with the exception of the "DUKW" and the small coastal tanker, were inferior to naval equipment for amphibious operations on open beaches. There were no self-propelled lighters comparable with the Landing Craft Tank, which had approximately 50 per cent of the carrying capacity of the comparable Transportation Corps 104-foot steel barge, but had from three to four times its performance by reason of being self-propelled. The daily capacity of the 300-ton, 104-foot, steel barge averaged less than 75 tons, as compared to the 250 to 300 tons of the Landing Craft Tank.

SECTION 2

THE CONTINENTAL PORTS

45. Supply Planning. During the planning period, supply requirements for the six minor ports and Cherbourg (VO 1522) were based on estimates of 90 per cent damage and the repairs believed necessary to support planned discharge. Engineer estimates of needed supplies were broken down to a daily tonnage basis, including equipment which was to move by ship and barge and construction material, a large portion of which was "pile rafts". Engineer Port Construction and Repair Groups were ear-marked for the task of rehabilitation and were to be reinforced with General and Special Service Engineer Regiments. Considerable pre-planning was necessary in order to provide for the arrival of

material as required and for field supervision of movement, especially to identify material. In addition, security measures tended to increase supply difficulties, especially in the routing of certain equipment and materials. [1]

46. Opening of the Port of Cherbourg (VO 1522). Immediately after the capture of Cherbourg , a joint Army and Navy reconnaissance was made of all French ports under American control and estimates of capacity were increased.[5] The basis for planning subsequent to the reconnaissance anticipated the reduction in the coaster fleet after D + 90 and the necessity for developing sheltered anchorage for full sized ships, the bulk of which would come directly from the United States. It was estimated that by D + 90, it would be necessary to have not less than 52 ships working cargo daily in the Continental ports in order to provide necessary support for operations.[5] It was further planned that 34 ships could be accommodated in Cherbourg for quayside and lighterage discharge. Incident to these operations was a requirement for handling 1,800 freight cars daily. At the time, yard facilities existed to accommodate only about one quarter of this number per day. The balance of port clearance would be effected by motor transport, which, until the rail facilities were available, would provide practically the entire facilities for movement out of the port of Cherbourg. [5]

b. Because of the nature of the damage, which denied berthing facilities, the immediate problem was the construction of "hards" or landing aprons for "DUKW's" and landing craft. The beach adjacent to the seaplane base was prepared for "DUKW" operations, and the areas which had been filled in at some previous time, designated as the Terre Plein and Reclamation areas, were similarly scheduled for beach landing operations, the ultimate object being to provide a concrete apron for Landing Ships Tanks and a wooden pier for the discharge of barges. Meanwhile, mine clearance was progressing, as well as the removal of block ships. This work had proceeded at such a rate as to enable the first vessel to discharge cargo ashore on D + 40 (16 July 1944).

47. Difficulties in Operations.

a. Cargo handling gear, which had been loaded on ships scheduled for D + 11 to D + 15, had been off-loaded at other ports and was considerably delayed in arriving at Cherbourg. This was also true of cranes and tractors which had to be moved from the beaches. Some captured enemy material was located and used, particularly some 90-ton cargo slings. Crane operators were in extremely short supply to such an extent that schools for their training were established in the first week of operation of the port.

b. Lack of control and poor documentation contributed to the confusion in barge operations. Barges were landed without informing the Operations Officer as to the identification of the ship from which the cargo had been removed. Trucks returned to transfer points because they could not find the depots. Order was, however, gradually restored. Traffic regulations were enforced, and the rate of discharge increased. By 31 July 1944, the port was operating at 91 per cent of the estimated capacity. Two "DUKW" companies discharged 4,437 tons in 16 days, or an average of 138 tons per day per company. Fifty-four barges were employed to off-load 24,894 tons in the same period for an average of 28 tons per barge per day. During August 1944, the rate of off-loading showed even more improvement. Barge operations accounted for an average of 249 units in use. Thirty-five days after its capture the daily average capacity of the port had reached 7,980 tons. Six Liberty ship berths were available for direct quayside discharge. Rail facilities had been improved so that by 31 August 1944 slightly over 3,000 tons a day were moving out of

the port area by rail. Of serious import, however, was a backlog of almost 72,000 tons of cargo awaiting clearance. By the end of September 1944, the daily discharge rate was 10,480 tons exclusive of bulk petroleum products and 7,836 freight cars and locomotives. Personnel movements, in and out, totalled 81,000 for the month of September 1944. The capacity for discharging railway equipment at Cherbourg (VO 1522) was its most important asset, and lack of marshalling yards and limited highway capacity for outward movement, its principal handicap.

48. Further Planning for Port Development.[6] After the breakthrough at St. Lo (VT 4963), the advance of the Armies south and southwest had uncovered the minor Brittany ports. Tonnages discharged on the Continent were still short of that planned, and further port facilities were necessary. The approach of autumn, with increasing bad weather, would greatly hamper operations over the beaches. A reappraisal of port facilities and capabilities resulted in the estimates shown in Table II.

TABLE II

ESTIMATES OF PORT CAPACITY (IN LONG TONS PER DAY)

	D + 90	D + 120	D + 150
Beaches	16,000	9,000	6,000
Minor Normandy Ports (a)	8,800	7,000	7,000
Cherbourg (VO 1522)	15,000	20,000	20,000
Minor Brittany ports (b)	4,000	6,000	8,000
Brest (VV 9996)		3,600	4,000
Total capacity estimated	43,800	45,600	45,000
Coaster capacity required	9,800	10,000	11,000
Total capacity required	37,627	38,642	47,843

(a) All coasters required to obtain this capacity.
(b) 50 per cent coasters required to obtain this capacity.

To realize this program, it was necessary to provide for the berthing of 75 Liberty ships per day, with a total carrying capacity of 36,843 tons. It was believed that the necessary berths could be developed in the different ports as shown in Table III.

TABLE III

ESTIMATES OF BERTHS BY PORT AREAS AS OF D+150

Cherbourg (VO 1522)	40
Brest (VV 9996)	8
Cancale (VS 9217)	12
Additional*	15
Total	75

* To be furnished by beaches.

49. Need for New Ports. The change in direction of military effort eastward, and localized resistance in the Western Brittany port areas, caused a change in over-all planning. The over-running of 120 days of phase lines between 25 July and the end of August 1944, indicated the necessity for moving the base of supplies further east to reduce the greatly extended lines of communication. Rail and pipeline facilities were not yet extended far enough to support operations, and motor transport was overtaxed in the effort to keep up the flow of supplies forward. It was evident that additional and more strategically located ports would have to be developed. (See Maps, Appendices 2, 3, and 4.)

50. The Seine River Ports. Early in September 1944, Le Havre (VL 4027) and Rouen (VM 2817) had fallen to the British Army, together with other northern Channel ports in the vicinity of Calais (VG 8777) Negotiations were opened immediately to obtain the use of Le Havre and Rouen for United States operation.[7] (See Map, Appendix 4.) When the advance party arrived in Le Havre, they observed that the port was very heavily damaged. Much work would be required before shipping could use its facilities. The capabilities of the area were great. Le Havre lay at the seaward end of the Seine River and had been used extensively as an inland waterway terminus. Its rail connections north and east were excellent, though considerably damaged. Rail connections to the south were broken by bridge destruction all along the Seine River to well above Rouen. Cargo discharge commenced on 4 October 1944 and by 30 October 1944, attained a daily maximum of 5,900 tons with a daily average for the period of 2,190 tons. Rouen was opened on the 16 October 1944 and on 31 October 1944 had reached a maximum capacity of 4,504 tons daily, and a daily average of 1,680 tons. The maximum capacities indicated the capabilities of these two ports. Rouen, while considerably less damaged than Le Havre, was restricted to the reception of coasters until the quays were prepared for the berthing of ocean-going vessels, partially discharged at Le Havre. This practice permitted discharge of ships on either side of the Seine River and assisted in expediting movement south-easterly and further saved rail and road facilities for the distance between Rouen and Le Havre. The opening of Le Havre and Rouen compensated for the loss of anticipated facilities in the Brittany ports, including Quiberon Bay, and permitted the closing of Normandy beach operations by 19 November 1944. It was then apparent that with the opening of Antwerp (VJ 6795), clearance of which was then under way, that all of the necessary capacity for the receipt of cargo was assured and would permit the maximum support of all contemplated operations.[7]

51. Opening of Antwerp and Ghent.

a. Between 6 September 1944 and its opening at the end of November 1944, the port of Antwerp was prepared for its major task of supplying the bulk of cargo required to support the Armies. Much of this delay was due to the continued presence of the enemy on the Scheldt River. Arrangements had been concluded with the British for joint operation, although the Americans and British were to control their own areas and operate independently. Road networks to the east and north were reserved for British use, and those south-east and south for United States use. Since movement south would involve crossing British controlled areas, fixed road circulation was provided, with close supervision. Depot facilities outside of the port area were reserved for British use within the territory controlled by 21 Army Group (British).[8] By 31 December 1944, the port of Antwerp was discharging an average of 13,794 tons of cargo daily exclusive of bulk fuel oil and gasoline, and had exceeded 22,800 tons on 14 December 1944.[7]

b. Shortly after the opening of Antwerp, the relatively untouched port of Ghent (VJ 1981) became available.[7] Ghent is located at the inland terminus of the Ghent-Terneuzen Canal and could receive full sized ocean-going vessels of the Liberty type, at reduced draft. The V-weapon attacks against Antwerp had caused much concern about the reception of ammunition ships there, and it was decided to divert them to Ghent, which had received little enemy attention, and to the ports of Rouen and Le Havre. Ghent had a substantial fleet of barges available. Road communication with both Antwerp and Liege (VK 4727) was adequate, and a minimum of construction of damaged bridges was necessary. Its proximity to the Charleroi (VJ 6706) maintenance area made it an especially valuable port. It had been agreed with the

British that no United States base depots would be established in the vicinity of Antwerp (VJ 6795), and it was therefore necessary to store discharged cargoes in the transit areas of the port. A tremendous back-log of loaded freight cars and canal boats accumulated during the German counter-offensive of December, 1944-January, 1945, and was cleared only after the provision of additional depot space in the Army rear areas.[1] The opening of Ghent (VJ 1951) solved, to a considerable degree, the ammunition discharge problem, which had assumed serious proportions by reason of the greatly extended haul eastward from Rouen (VM 2817), Le Havre (VL 4027), and the Cherbourg (VC 1522) Peninsula. Short haul delivery was now possible to the Liege (VK 4727)-Charleroi (VJ 6706) area.[7] (See Map, Appendix 6.)

52. The Effect of the Invasion of Southern France.[9]

On 15 August 1944, the Seventh United States Army, reinforced by British and Canadian assault units and the First French Army, supplemented by an Airborne Task Force of United States and British units, effected a landing on the southern coast of France. Enemy resistance was not as determined as in Normandy and by D + 15, the Armies had over-run 45 days of phase lines. The ports of Marseille (BT 4615) and Toulon (VY 9397) had been cleared of the enemy but reconnaissance indicated that for the time being Toulon was too badly damaged to be brought into immediate use. All efforts were therefore concentrated on developing the port of Marseille. Most of the harbor was blocked, and land and water mine concentration was extremely heavy. Originally, Marseille could berth almost 50 full sized ships at its 23 piers and long mole. Prompt mine clearance by Engineer and naval personnel counteracted much of the potential demolition value of that prepared by the Germans prior to their departure. A total of 33 sunken ships were found, and preparations made for their immediate clearance. By 1 September 1944, the 6 Port personnel and equipment had arrived, and on 15 September 1944, the first ship for general cargo discharge was berthed. Before long, Marseille was able to accommodate 38 Liberty ships for dockside discharge. Meanwhile, the reconstruction of Toulon was in progress, under the direction of the French Navy, and the first Civil Affairs ship docked there on 5 September 1944. Port du Bouc (BT 1326) a satelite port of Marseille, located 30 miles to the west and used principally as the seaward terminus for barge traffic on the Rhone River, was also damaged, but to a much lesser degree. It possessed sufficient facilities to relieve the main port of Marseille of some of the pressure. The success of the beach operations was in no small measure due to the presence of 12 "DUKW" companies. These vehicles were again used in Marseille until dockside berthing had been provided. Throughout subsequent operations, the ports of Marseille and Port du Bouc were able to satisfy all Seventh Army and First French Army (Army B) requirements. Vessel discharge rates were consistently higher than elsewhere in the European Theater of Operations, and port clearance was prompt due to the better rail connections available. By 1 October 1944 (D + 40 for the invasion of Southern France), the rail clearance capacity at Marseille was 5,500 tons as compared to 3,800 tons for Cherbourg at the equivalent date.

53. Rates of Cargo Discharge.

a. From the varied experience during the course of operations, certain basic rules for estimating port capabilities were solved. In making these estimates, it is assumed that the cargo is cleared from the unloading area. The estimates are further predicated on a 20-hour working day of two 10-hour shifts. It was found that two eight-hour shifts could accomplish as much work and resulted in less absenteeism of civilian labor over an extended period of time. The actual rates

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of discharge of full ships are shown in the statistical charts of Appendix 1. It may be anticipated that:

(1) Approximately one long ton of general cargo can be handled by each laborer used, exclusive of truck-drivers and crane operating personnel.

(2) A ship discharging to ferry craft can be discharged at an average rate of:

300 tons per day when cargo is landed on beaches.

400-500 tons per day when cargo is discharged in badly damaged ports, where clearance is difficult, and rehandling is required.

650-850 tons per day when cargo is discharged in well organized ports, where damage is slight and direct rail connection is available at the quays.

b. The rates attained in practice were nearly the same as in the "Overlord" plans. Differences between plans and execution in this respect occurred usually because of delays in berthing ships after arrival, weather interference with ferrying operations, or limitations because of port clearances being slower than anticipated. There were no difficulties experienced in attaining the maximum rates when dockside discharge was possible. Care should be used, however, in their application to include weather considerations, and the availability of adequate transportation for port clearance.

SECTION 3

DIFFICULTIES ENCOUNTERED IN MARINE AND PORT OPERATIONS

54. Allocation of Shipping and Command Functions in Ports.

a. Following the establishment of Headquarters, Communications Zone, in Paris (VS 0544) and the transfer of ship allocation and diversion from the United Kingdom to the Continent, it became apparent that major changes in procedure would be required. Up to that time the British Admiralty and Ministry of War Transport in cooperation with Movement Control had determined the allocation of shipping to ports. With the transfer of the mass of the United States Forces to the Continent, this function was absorbed by Headquarters, Communications Zone, and the only elements retained by the British Admiralty were the naval functions of convoy routing, instructions, escort, and control. Until early December, 1944, the Assistant Chief of Staff, G-4, Communications Zone, retained authority for allocating ships to ports and the Chief of Transportation was concerned in an advisory capacity only. With the opening of the Channel ports and the necessity for implementing an adequate supply movement program, the Chief of Transportation was charged with the responsibility for ship diversion and allocation. Shipping was allocated to ports with reference to port capacity, both discharge and clearance; and the planned tonnage, destination, and priorities of supplies as established by the Assistant Chief of Staff, G-4, Communications Zone. The Marine Operations Division of the Office of the Chief of Transportation became responsible for the scheduling of shipping in co-ordination with the Movements Division of the same office. The Chief of Transportation had the sole responsi-

bility for the assignment of harbor and coast-wise craft including floating cranes and heavy port equipment.

b. Thus, important functions logically belonging to the Chief of Transportation had come under his direction as a result of experience, and his potentialities of service to the Armies were better realized. The new authority given to the Chief of Transportation established a form of exempt status for the operational control of the ports and allied marine activities. The authority of the Chief of Transportation did not, however, include command functions. It would have been desirable to vest in him the authority to shift port operating units to meet changing requirements and to establish facilities auxiliary to the ports such as repair installations outside of port areas, and staging areas. The activities of the ports concerned the receipt of personnel and materiel, which is a matter of primary interest to the Theater Commander, and movement within the European Theater of Operations is based on plans and programs established on Theater level. The increased personnel required to staff Base Section Headquarters by reason of port activities might be used to better advantage within port organizations.[11]

55. Lack of Staging Areas.

Planning had provided for the operation of staging areas during the "Neptune" phase and one Quartermaster Company (Staging) was included in the troop movement list, and a Staging Battalion Headquarters. Because of the confusion incident to the phasing-back of service units, and their replacement by combat troops, this plan was not executed, and the transit areas in the rear of the beaches more or less ran themselves, not being organized in any formal way as staging areas. There were no staging areas included in the port installations, and no provision existed within the port structure for their activities. The Chief of Transportation lacked the authority to provide for their establishment as port facilities.

56. Lack of Base Depots near Port Areas.

a. The lack of base depots adjacent to the ports for the conversion of "tonnage to items" was one of the greatest difficulties encountered by the Transportation Corps. After the break through at St. Lo (VT 4963), the fast moving situation denied the establishment of base depots in the areas near the ports, and placed the burden of sorting on the port complement—for which task neither personnel nor facilities were available to the extent necessary.[7] The quay space at Cherbourg (VO 1522) was overcrowded from August, 1944, until late in the spring of 1945—so much so that the port organization was made responsible at the latter date for all depot operations in the vicinity, and absorbed their facilities.[7] The same conditions of overcrowding obtained at Le Havre (VL 4027) and Rouen (VM 2817). At Antwerp (VJ 6795), there was sufficient storage space within the port to minimize quayside over-loading, although much double handling was involved. The embargoes on freight movements into the Liege (VK 4727) area following the German counter-offensive of December, 1944-January, 1945, and the retention of a pool of loaded freight cars as a rolling reserve, caused a tremendous back-log at Antwerp, reaching at one time almost 370,000 tons—or 20 to 25 days of discharging capacity.[11]

b. A plan was prepared early in November, 1944, for the establishment of advance and intermediate depots, with sorting to be accomplished at the intermediate depots, and overflow (above requirements to maintain pre-determined stock levels) absorbed by rear area depots.[8] The purpose of this plan was to relieve the ports of sorting, and to expedite clearance with only general classification. At the time, commodity loading

was still in effect, and general classification provided sufficient identification for shipping documentation. The plan was placed in operation, and while a small gain was noticeable in the ratio of clearance to discharge, the principal effect was to ease the burden on port personnel, then beginning to feel the effects of the requisitioning of combat Infantry replacements. The over-all effect of the plan was primarily evident in the more effective co-ordination and use of all forms of transportation. (For depot areas, see Maps, Appendices 2 to 8 inclusive)

57. Use of Military Labor. During operations in the United Kingdom, labor union considerations required that military personnel be employed only in supervisory capacities, particularly in cargo handling, and in the crane and barge erection programs.[10,11] Thus, an opportunity to train military personnel for operations on the Continent was lost. While labor difficulties did not hamper operations to any appreciable degree in the United Kingdom during the course of hostilities, and only to a minor degree on the Continent at Antwerp (VJ 6795), complete freedom from this source of trouble is desirable. In the case of Antwerp, it had been agreed that only civilian stevedore labor would be used, and during the strike early in 1945 occasioned by V-weapon attack, troops were not available to replace striking civilians.[11]

58. Defects in the Port Organizations.[10] It was evident that considerable strengthening was required in the Transportation Section of the Port Headquarters. There was a shortage in certain classes of skilled and technical personnel, not only in the Port Headquarters, but also in the Port Battalions. In practice, it was partially solved by using Harbor Craft Company and Traffic Regulating Group personnel to supplement the work of Port Battalions, to the detriment of other operations. The most serious shortages were:

a. There was no provision for personnel charged with the responsibility for maintaining cargo handling gear, other than the small supply organization, which was not adequate for the purpose.

b. There was a definite lack of technical specialists both as allotted, and as furnished, in the following classifications: stevedore foremen, crane operators, cargo clerks and cargo checkers.

c. There were many instances, particularly during the Red Ball and XYZ trucking operations, when truck companies assigned to the ports were removed, thus hampering clearance. This was especially noticeable in the operations at Cherbourg (VO 1522), Marseille (BT 4615), and Antwerp. In other instances, Base Sections removed truck units to meet local requirements.

59. Comments on Coast-wise and Harbor Craft.

a. The types of medium tugs supplied were not suitable for berthing ships by the towing method in confined harbors. They were intended for towing with long hawsers and for "breasting," (pushing) maneuvers, and unless manned by crews more skilled in such operations than were available, were hazardous to operating personnel. At least three were capsized as a result of attempting to change direction while towing in confined harbors. The trouble arose because of the location of the towing bitt, which limited the ability to change direction while using a short tow line. Corrective action was instituted and a suitable expedient developed, but due to the relatively late date in operations, was not generally applied. A report in connection with proposed modifications was forwarded to the Chief of Transportation in Washington. Medium class towboats (Type ST) weighed about 200 tons as lifted, and

were carried on the decks of specially prepared Liberty ships. When towboat requirements were pressing, it was not difficult to arrange priority for their off-loading. No facilities for unloading them were known to exist in France, Belgium, or Holland, though some information was available on the existence of several German cranes in the North Sea at Kiel (VC 4533), Hamburg (RS 5060), and Bremen (RR 7000), with the likelihood of their destruction before capture. Thus, at the time the craft were delivered, the only available facilities for unloading them were the heavy lift facilities of the British Navy at Liverpool (VD 8210) and Portsmouth (WQ 2019). This condition was later to cause considerable difficulty in providing medium size tow-boats required at Marseille (BT 4615). There were no cranes in the Mediterranean Zone with sufficient lifting capacity and height to permit deck loading. The towboats were required to proceed from the United Kingdom under their power--fortunately without loss. Over six weeks, however, elapsed between initial dispatch and arrival, though the voyage actually required less than 14 days.[12] Experience indicated that another type of craft, not only more seaworthy, but also of lesser draft and a higher degree of maneuverability, was required--one capable of being lifted by standard Transportation Corps floating cranes of 100-ton capacity in order to permit assignment to other Theaters. Suggested military characteristics for such a craft have been forwarded to the Chief of Transportation, Army Service Forces, for consideration by the War Department.[12]

b. The small coastal tankers of the Transportation Corps were extremely valuable, and would have been more so with the general provision of displacement type pumps for discharging cargo. As used, principally in the Seine River shuttle, to take advantage of tonnage available at Rouen (VH 2817), they averaged 16,500 ton miles per day. Two of them averages 26,000 ton miles per day for a 75-mile water distance. Under average conditions the performance was equal to that of a 2000 gallon tanker truck company, but requiring only 50 per cent of its personnel for operation.[12]

c. The shallow draft coast-wise ship was proved beyond question to be essential to the success of amphibious operations. The United States Maritime Commission had prepared designs for the so-called "Baltic" type coaster, but their number was not nearly adequate, and all coasters used in operations were supplied by the British. It was necessary to provide up to 10,000 tons of coaster capacity by D + 180; with an average of an 11-day turn-around and an average capacity of 1000 tons, 110 vessels were required. No small cargo vessels were supplied by the Transportation Corps for the movement of general cargo in the European Theater of Operations, other than those obtained from British sources. It will be recalled that the coaster fleet for the "Neptune" phase involved the services of almost 400 coasters.[5]

SECTION 4

CONCLUSIONS AND RECOMMENDATIONS

60. Conclusions.

a. Confusion existed from the lack of prompt receipt of cargo mmanifests because of lack of adequate communications, causing delay in unloading.

b. The detailed selective unloading required to meet rapidly changing combat conditions, principally because of higher than anticipated rates of expenditure of certain types of ammunition, was not possible within the plan for pre-loading shipping.

c. Inexperience on the part of Army port representatives in United Kingdom ports, was responsible for failure to provide slings and gear for unloading vehicles from ships arriving directly from the United States by way of the United Kingdom and which were expected to be discharged at quayside with port equipment.

d. Port Company personnel was inexperienced in ship discharging operations, particularly those incident to offshore discharge into ferry craft. This was especially noticeable in the case of those companies embarked with the pre-stowed ships in the early assault phase.

e. Documentation was not sufficiently policed. Personnel responsible for preparing hatch tallies were not sufficiently trained and experienced by reason of unfamiliarity with cargo, and frequent omissions of information caused confusion.

f. The types of Transportation Corps ferry craft, other than the "DUKW" and the small coastal tanker, were not suitable for use in support of amphibious operations on open ocean beaches.

g. The most valuable ferry craft used in all operations was the Navy Landing Craft Tank, and the 2½-ton amphibian truck. Performance of the latter was outstanding.

h. Tactical considerations governed the selection of ports used for discharging cargo on the Continent during the early stages of the operation; later, ports were selected with reference to proximity to depot and consuming areas as weighed against the work required for their reconstruction.

i. In all cases where cargo discharge is expected to exceed 4000 tons per day, the use of piers, either fixed or floating, is essential to obtain the necessary economy of personnel and equipment.

j. Centralization of control of diversion of shipping and allocation to ports was not provided until relatively late in operations, and throughout operations the port organizations were subordinate to the Base Section commanders.

k. The military ports did not enjoy complete freedom from trade-union action and should under no circumstances permit cessation of operations by reason of strikes or other labor disturbances where such could be avoided by the use of troop labor.

l. The lack of a strong Transportation Section was particularly evident in Port Headquarters.

m. The removal of truck companies assigned for port clearance frequently caused accumulation of cargo on the quays.

n. The types of medium tugs supplied were not suitable for berthing ships in confined harbors.

o. The small coastal tankers of the Transportation Corps were extremely valuable.

p. The usefulness of the shallow draft coast-wise ship was proved beyond question; it was essential to the success of water-borne support for amphibious operations and for the exploitation of shallow depth ports.

61. Recommendations. It is recommended that:

a. Consideration be given to granting limited exempt status to ports of embarkation or debarkation and the establishment of a Water Transportation Service for their general supervision under the command of the Chief of Transportation. The limited form of exempt status contemplated should not include courts-martial jurisdiction, finance, common supply, and personnel accounting, but should include assignment, re-assignment, transfer, promotion, and demotion of personnel.

b. Operational doctrine of the Transportation Corps should anticipate extensive employment of Transportation Corps troop units in amphibious operations.

c. Operational doctrine of the Transportation Corps should provide and require the use of Army controlled ferry craft at the earliest possible stage of amphibious operations in order to relieve the Navy for tactical missions elsewhere.

d. Port battalion training should include a substantial proportion of actual operations in the discharge of all types of shipping in open anchorages, including also all types of winch operation, and the use of heavy-lift cargo handling gear.

e. Training policy for all Transportation Corps port and marine operations troop units should provide for joint exercises with Engineer and Naval units in establishing beach facilities for the reception and clearance of cargo.

f. Consideration be given to the further study and amendment of pertinent Tables of Organization and Equipment of the units listed below to correct deficiencies which became evident in the European Theater of Operations, with particular emphasis on the Transportation Section of Port Headquarters and the following:

Headquarters and Headquarters Company, Major Port Mobile.
Headquarters and Headquarters Company, Medium Port Mobile.
Headquarters and Headquarters Company, Port Battalion.
Port Company.

g. Consideration be given to the further development of types of floating equipment suitable for Transportation Corps participation in amphibious operations, or those immediately following an amphibious assault, to include:

(1) Self-powered beaching type lighter, similar to the Navy Landing Craft Tank.

(2) Shallow draft coaster type cargo vessel, of about 1000 deadweight tons and 15 to 17 foot draft, capable of being produced in quantity.

(3) Shallow draft, beaching type, medium tug, of 600 to 700 horse power, and with a lifting weight of less than 100 long tons, suitable for operation in restricted waterways.

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CHAPTER 3

THE MOTOR TRANSPORT SERVICE

SECTION 1

PLANS AND EARLY OPERATIONS

62. General. It was not until relatively late in the course of operations that a degree of autonomous operational control of motor transport was realized. The same situation existed in World War I: the Motor Transport Corps came into existence in July, 1918, just four months prior to Armistice Day.[1] In World War II, as late as VE-Day, there was in the European Theater of Operations no centrally controlled Motor Transport Service, other than provisional. Obviously we had failed, to a degree, in applying lessons previously learned in combat. At the early appreciation of operation "Overlord" there was no adequate organization for what was to be the largest military truck operation in the history of modern warfare.

63. Planning for Continental Operation.

a. In order to provide for the support of the Armies in subsequent phases of operation, assuming a fairly steady advance across France, it was necessary to plan for the motor transport of the total tonnage required by the Armies and the Communications Zone, until the railways could be brought into operation. To accomplish this mission, it was estimated that in addition to those truck units furnished to the Armies, the following should be provided:

(1) 240 truck companies for use in the Communications Zone, two-thirds of which were to be furnished with heavy equipment.

(2) Two drivers to be provided for each truck or prime mover to permit around-the-clock operations.

The plan was further detailed to estimate the requirements for the several types of truck operations in the Communications Zone—port clearance, static operations, and line of communications hauling. It was estimated that the average forwarding distance on lines of communication would be about 150 miles and for port clearance and static operations, about 10. It was further estimated that the average daily mileage of each truck would be 300 miles in line of communications hauling and 50 miles in port clearance and static operations.

b. The number of truck companies authorized by Theater Headquarters, however, was only 160. Authorization had been obtained shortly before D-Day for the procurement of additional drivers. There was sufficient motor transport available for the earlier phases of "Overlord". For operations scheduled immediately following D-Day it was planned that 130 truck companies would be provided for use on the Continent, inclusive of those scheduled for commitment by D plus 41. By that time, the daily tonnage movement required would reach about 23,700 long tons daily, equal to 27,300 "short" or truck capacity tons. For the control of those units, a provisional Brigade Headquarters was authorized and somewhat hastily organized early in May, 1944, by the Advance Section, Communications Zone.[2] It was realized that centralized field control would be required. The command functions of the Brigade, however, would not extend beyond the geographical area of the Advance Section.

64. Early Operations on the Continent. The relatively limited depth of the lodgement area up to near the end of July, 1944, meant short haule in the delivery of supplies. Delay in the capture of Cherbourg (VO 1522) resulted in delaying the arrival of truck units on the Continent, but in this period, more companies arrived in the United Kingdom from the United States.[3] By 30 July 1944 (D plus 54), 94 of the scheduled 130 companies were on the Continent. The extremely overcrowded conditions existing in the lodgement area and mud conditions made truck operations difficult. Up to the time of the break-through at St. Lo (VT 4953), truck strength was actually in excess of needs, based on potential capacity in ton miles. This condition, however, was short lived. The retarded rate of advance had caused the establishment of what were to serve as base dumps for a long period in the area inland from the Beaches, and to the south of Cherbourg. They were established in small fields in many cases with inadequate traffic facilities. Continual rain had turned many of the areas into quagmires and airstrip landing mats were used extensively as road expedients.[3] Subsequently, the principal dump areas were transferred to the area north of St. Lo for the support of contemplated operations. (See Map Appendix 2) The rapidity of the advance far outstripped the ability of the railway repair units to establish railheads behind the Armies, with the result that motor transportation had to maintain an even higher rate of performance. Railway repair was expedited and by 15 August 1944 single track operations extended as far south as Le Mans (VV 4161). By the last week in August 1944, a single track line to Paris (VS 0544) was opened. But it was not enough. A long distance truck haul was required to support the fast moving columns of the Third Army. It was necessary to accumulate approximately 100,000 tons of essential supplies, as a base of supply for mounting further operations. These supplies were to be delivered in the vicinity of Le Mans by 1 September 1944, which was later extended to 4 September 1944 in order to bring up the cargo which the railways had failed to deliver.[2] This haul was to be known as the Red Ball route. (See Map Appendix 3)

66. The Red Ball Route. On 23 August 1944 the Red Ball Express route was placed in motion, with the diversion of all available truck capacity to the dump areas in Normandy with orders to commence loading. (Red Ball indicates "through" fast freight in railroad parlance.) It had been planned quickly, with the assistance of the Motor Transport Service of the Transportation Corps. The truck companies of the Motor Transport Brigade and all other available Communications Zone units, were pressed into service. As planned, the route was operated as a one-way return loop highway system, for which two parallel road nets existed, both in good condition beyond St. Lo and extending to Chartres (VR 3903). As it became necessary to extend the operation, Military Police protection and vehicle maintenance patrols were added. Bivouac areas were designated and provisions made for relief of drivers, as well as facilities for first and second echelon maintenance. Originally no provision was made for signal communication, but a radio network was soon provided between the operating headquarters and the diversion points, at which the convoys received instructions, as to final destination. Later some telephonic equipment was added. The diversion points were located first at Chartres, the original terminus of the route, later at Versailles (VR 9048), and eventually in Soissons (VS 8997) and Sommesous (VT 4021).[4] The "Red Ball" was adopted as a road marking device to identify the route. Full head lights were permitted for night driving as far east as the Seine River.[1,4]

b. On 25 August 1944, 67 truck companies hauled 4,482 tons of cargo. On 29 August 1944, 132 companies were committed and the peak tonnage of 12,342 tons was moved. Up to the conclusion of operations on 13 November 1944, 421,193 tons were forwarded, an average of 5,088 tons per day, using an average of 83 companies, over an average round-trip distance of 606 miles. The average number of vehicles forwarded

daily was 899, transporting 5.67 tons per vehicle. A chart of daily performance is given in Appendix 1, Statistical Charts. Since only a small portion of the large capacity trucks which had been requested by the Transportation Corps were available, it was necessary to organize provisional truck units from two Infantry divisions than in reserve, and two Chemical Smoke Generating Units.[4]

SECTION 2

LONG DISTANCE EXPRESS ROUTES

66. "POL Hauls."[4] From the beginning of operations on the Continent, the Motor Transport Service was engaged in hauling large quantities of petroleum products. These operations required a high degree of flexibility, due to frequent changes in dumps, pipeheads, and decanting points. Nine companies using 2000 gallon semi-trailers and five companies, using standard 750 gallon tank trucks constituted the bulk of the fleet used for the transportation of gasoline. Other petroleum products, diesel oil and lubricants, were transported in cargo trucks in drums or cans. Later in the campaign, three companies were equipped with 10-ton semi-trailers, on which were mounted four 750-gallon skid tanks. In the period 14 June 1944 to 28 February 1945, 461,380 long tons of gasoline were hauled an average distance of 122 miles. To provide for centralized control over these operations, a "POL Section" was provided in the Motor Transport Service. All of the Transportation Corps tanker vehicle fleet remained under its control throughout operations. The units were attached to the Sections of Communications Zone for administration only.

67. Red Lion Haul.[4] To support United States-British airborne operations around Arnhem (QT 7775) in eastern Holland, the Red Lion operation was initiated on 16 September 1944, and continued until 12 October 1944. Six companies equipped with 2½-ton trucks and two companies equipped with 10-ton semi-trailers transported 17,556 long tons a distance of 306 miles, from Bayeaux (VT 7989) to Brussels (VJ 6355), at a rate of 650 tons per day. This operation controlled by Transportation Section, Normandy Base Section, while relatively small, was efficiently handled and well supervised.

68. White Ball Operation.[4] Because of the damage to the railroads, it was not possible to move the tonnage being discharged at Le Harve (VL 4027) and Rouen (VM 2817). The White Ball route for motor transport was organized to move the cargo to the Soissons (VS 8997)-Reims (VT 3979) area, and to the rail transfer points in Paris (VS 0544). It was organized in a manner similar to the Red Ball route, then still operational. Channel Base Section was responsible for movement control, and a Quartermaster Group Headquarters (Transportation Corps) was assigned operational control. An average of 29 companies participated, the peak number being 48. The operation moved 143,067 long tons over an average round-trip distance of 226 miles, the daily average being 1,475 long tons. Some of the defects in operation were:

a. The Channel Base Section, charged with movement control, diverted trucks for local purposes.

b. Co-ordination and planning were poor, depots were not aware of movements, and labor at unloading points was not available. Analysis showed loading and unloading time to be excessive.[4]

69. Green Diamond Haul. This operation provided for the movement of supplies from the dump areas in the Cherbourg Peninsula to the rail-

transfer points at Dol (VS 9083) and Avranches (VT 2817). It was of short duration during October and November, 1944, and 15,590 long tons of cargo were moved an average distance of 100 miles with a daily average of 821 long tons. A truck group headquarters and 15 truck companies participated, under the control of Normandy Base Section. During peak operation, a total of 23 companies were used. This operation was handicapped by bad mud conditions at the dumps. Planning was poor; confusion existed as to the responsibility for initiating movement and command supervision was poor.[4]

70. "ABC Haul." To provide for the transportation of cargo from Antwerp (VJ 6795) to the Liege (VK 4727)-Charleroi (VJ 6706) depot area, the Motor Transport Service, by agreement with Channel Base Section, planned and co-ordinated the control and operation of an express motor service known as the "ABC Haul". It was decided to use only companies equipped with 10-ton semi-trailers, as these vehicles were adaptable to the situation. The port of Antwerp was then operating on the basis of a 15-hour working day. Semi-trailers were loaded in the port, cleared to "surge" pools, and moved out by the over-the-road truck-tractors. Sufficient semi-trailers were provided to permit 24-hour movement over the road. The operation was started on 30 November 1944, and continued to 26 March 1945. An average of 14 companies participated and transported 244,924 long tons of cargo, with an average of 2,094 tons daily, over an average round-trip distance of 180 miles. At first, some of the depots were operated only 12 hours daily, but later most of them were opened for full 24-hour operation. An early difficulty, quickly remedied, arose from the retention of trailers in the depots while the load was being sorted. Unloading time was steadily reduced until it was less than 5 per cent of the time on dispatch. This operation may be viewed as a normal port clearance movement by a line of communications haul. It should be noted that, had the base depots been within reasonable distance from the port, the same trucking capacity could have transported three to four times the tonnage daily.

71. Support of Armies to Contain Ardennes Counter-Offensive.[5]

When it became apparent that the German counter-offensive of December, 1944-January, 1945, was of major magnitude, it was necessary to divert all available transportation in order to move two airborne divisions and elements of the Third Army into new battle positions without delay. Communications Zone furnished approximately 50 truck companies on short notice to move the 101 Airborne Division from the Reims (VT 3979) area to Bastogne (VP 5558) and, almost immediately after, six additional divisions. This major change in direction was initiated under the stress of battle emergency, and in general was well handled. The mission involved the movement of 87,236 men and 10,800 tons of cargo between 18 and 31 December 1944. By the end of December, about 50 per cent of the vehicles still remained in Army areas, of which 60 per cent were scheduled for early return for the resumption of the White Ball and "ABC" hauls as soon as possible.

72. "XYZ Haul."[4]

a. In motor transport work in the European Theater of Operations, a method of estimating carrying capacity in terms of "equivalent companies" came into general use. The unit of measure was a company equipped with standard 2½-ton cargo trucks, understood to be loaded, in normal operations, to double their rated capacity. A company equipped with 10-ton, flat bed, semi-trailers, truck-tractor drawn, is considered the equivalent of two standard companies. Estimated in this way, the 208 truck companies present in the European Theater of Operations in February, 1944, were equivalent to 308 standard companies.

b. By March, 1945, with the extension of combat operations into Germany, the Armies no longer had the support of good rail facilities. In anticipation of this condition, planning had been initiated by the Motor Transport Section in December, 1944, for major truck transport operations to support the Armies in their advance into Germany. Briefly, the plan for support of the Armies was that a motor transport system be provided to supply the following tonnages:

Plan	Capacity two-day turn-around	Capacity one-day turn-around
X	8,000	16,000
Y	10,000	20,000
Z	12,000	34,000

c. To implement this plan, two Highway Transport Divisions (Provisional) were organized, and later a third, under the operational control of Advance Section, Communications Zone. Co-ordination was the responsibility of the Motor Transport Service. Personnel was obtained from Headquarters and Headquarters Detachments, Quartermaster Groups (Transportation Corps), and supplemented with the most experienced Motor Transport Service personnel that could be spared. Each Division was to serve one Army. For the support of the Seventh Army the 469 Group Quartermaster (Transportation Corps), the equivalent of a Highway Transport Division, supplemented by additional personnel, was operated by Continental Advance Section. The operation in Southern France was designated as the Yellow Diamond Route. In operations, 6956 Highway Transport Division served the Ninth Army, and trucked supplies from Liege (VK 4727); 6957 Division served the Third Army, hauling from Luxenbourg (VP 8413); 6958 Division served the First Army, hauling from Duren (WF 1436); 469 Group served the Seventh Army, and trucked supplies from Nancy (VU 8512) to Saarbruecken (WQ 4551). It was planned to use Truck Battalion Headquarters detachments to man traffic control and dispatch points in the absence of other traffic regulating personnel. Signal communications and Ordnance support, and Military Police assistance were provided in the plan. For guidance, Standing Operating Procedures and detailed instructions were prepared by the Motor Transport Service. A tank truck battalion was assigned to each Highway Transport Division for handling bulk gasoline from pipheads to Army decanting points.

d. The system was placed in operation on 25 March 1945, and continued after VE-Day. The daily performance is shown in Appendix 1, Statistical Charts. A maximum of 238, and an average of 194 equivalent companies,[11] participated in the operation. The average distance hauled was 149 miles forward. By VE-Day, 629,296 tons of cargo were moved, an average of 14,320 tons daily. The average "equivalent company" accomplished slightly over 10,000 ton miles per day.

73. Problems and Deficiencies in "XYZ" Operations.[2,4,6] While the operation was highly successful from the standpoint of supplying the Armies, some deficiencies developed, principally as a result of the magnitude and distances involved. They were as follows:

a. Truck companies were dispatched to the Armies to support movement forward of Army rear truck heads and rail heads, thus reducing capacity in the rear area lines of communication. This condition arose because of shortages in Army organic transportation.

b. Improper documentation resulted in lack of control; reports were late or non-existent.

c. Shortages in driver personnel to provide two drivers per vehicle resulted in loss of truck capacity.

d. Occasional failure to co-ordinate movements between the Assistant Chief of Staff, G-4, of an Army, and Highway Transport Division Headquarters, resulting in confusion on roads and at truck heads.

e. Road discipline was not always well enforced.

f. Communications were not adequate.

g. Vehicle replacement was extremely slow because of great distances from Ordnance depots.

SECTION 3

PORT CLEARANCE AND STATIC OPERATIONS

74. Port Clearance Problems.[4] Normally, from 30 to 35 per cent of port clearance operations were performed by motor transportation even when good railroad facilities were available. During the beach operations, all clearance was by motor, and the average for the first five months after D-Day was about 70 per cent. Between 35 and 40 companies were thus employed in port clearance. Antwerp (VJ 6795) required the least use of trucks, only 25 per cent of its clearance being by motor and the balance by rail and water. The distance traveled by the trucks averaged eight miles per trip. The Transportation Corps Technical Manual "MOTRAN" was generally followed in port clearance especially in its provisions as to maintenance, resulting in a reasonably high efficiency. Some deficiencies in port operations were observed as follows:

a. During early operations, maintenance was neglected. In a few instances, directives were published by the Beach Commands and Normandy Base Section to omit periodic maintenance to secure continuous operation. Records indicate the high percentage of dead-lined trucks because of those conditions. Many of the difficulties during Red Ball operations were traceable to lack of proper maintenance during the earlier use of the same vehicles on the Beaches.

b. There was an inadequate supply of labor to load and unload trucks. This was especially serious in early operations.

c. There was a lack of supervisory personnel.

75. Static Operations.[4] Static operations, which included all activities other than port operations and line of communications hauling, absorbed the bulk of motor transportation. An average of from 150 to 200 "equivalent" companies were thus employed. During an ordinary day, in the period February to May, 1945, approximately 60,000 tons of cargo were moved an average distance of 11 miles. The Transportation Corps Technical Manual "MOTRAN" had not been authorized as a command directive and many of the difficulties observed in connection with static operations were the result of poorly conceived operating practices. The deficiencies most frequently observed were:

a. Lack of maintenance due to inadequate supervision by inexperienced battalion and company officers, especially during early operations. There were no officers provided in authorized Tables of Organization specifically for maintenance supervision.

b. Inexperience on the part of the personnel of Transportation Sections of Sections of the Communications Zone, which resulted in inadequate supervision.

c. Loading was not properly supervised and confusion and damage to cargo often resulted.

d. Group and Battalion Headquarters were not organized and trained to integrate port clearance, static, and line of communications operations into a general system of motor transportation.

SECTION 4

CONCLUSIONS AND RECOMMENDATIONS

76. Conclusions.

a. The performance of the Motor Transport Service, although organized only on a provisional basis, showed that it should be established on a permanent basis.

b. There was a sufficient volume of long distance motor transport movement to have justified the early activation of what were later known as Highway Transport Divisions.

c. Confusion resulted from poor co-ordination where long distance intersectional motor hauls were controlled by the Sections of Communications Zone.

d. The organization of the Headquarters and Headquarters Detachment, Quartermaster Group, was not adequate for the control of the motor transport units in long distance highway operations unless augmented by additional personnel.

e. There was a lack of trained and experienced motor transport officers capable of planning integrated operations.

f. It would have been advisable for two drivers to be provided for each operational vehicle for all Transportation Corps truck units, when round-the-clock operations are anticipated or required.

g. The use of provisional truck operating units was not satisfactory.

h. Maintenance supervision and regularly scheduled maintenance was generally lacking during the earlier phases of operations.

i. There was a lack of adequate support by other Services, particularly in signal communications, ordnance maintenance facilities and Military Police in the earliest long distance hauling operations (Red Ball, for instance). The provision of radio equipment to all echelons of command down to the company is highly desirable and necessary.

j. It would have been advantageous to have had about two-thirds of all Transportation Corps Truck Companies designated as Truck Companies (Heavy) and provided with heavy duty equipment.

k. Standardization of equipment is vitally important.

l. Cross-country mobility is not essential in all Transportation Corps vehicles, especially in those used for line-of-communications hauling.

77. Recommendations. It is recommended that:

a. The Motor Transport Service, including all motor transport units organic or assigned to the Transportation Corps, be authorized as an operational service of the Transportation Corps.

b. The Motor Transport Service be continued as an operational service during peacetime to provide for training of troops of the regular Army and its reserve components.

c. All motor transport units required to accomplish the mission of the Transportation Corps be placed under the command of the Chief of Transportation except such units as are organic to other Services.

d. A Highway Transport Division be provided for each single line of communications as necessary. It should include provision for the attachment of the necessary service troops to implement its operation. Highway Transport Divisions might also be attached to the Sections of the Communications Zone, or similar area commands, the geographical area of which might require the use of a division.

e. Appropriate Tables of Organization and Equipment be provided for a Headquarters and Headquarters Company, Highway Transport Division, Transportation Corps, and provision made for the attachment of troops of the Technical Services and the Corps of Military Police, for the accomplishment of the mission of the Motor Transport Service, when so directed by a Theater Commander. These Tables should also provide for an adequate, augmented command headquarters for the Motor Transport Service, where more than one Highway Transport Division is authorized.

f. A cellular type of Table of Organization and Equipment be used for the organization of Transportation Corps truck companies, with columns appropriate to the type of operations contemplated.

g. The battalion be considered the basic troop unit command echelon for Transportation Corps truck units within a Highway Transport Division. Command channels would be from Highway Transport Divisions direct to Battalion.

h. The maximum degree of standardization be provided in equipping units of the Motor Transport Service, with particular emphasis on tire sizes and inter-changeability of mechanical moving parts and bearings. Further, that development by the appropriate technical service should be continued in providing improved equipment of types found most efficient.

i. Truck units of the Motor Transport Service be provided in the ratio of two "heavy" companies for each "light" company.

j. Radio equipment be provided as organic to all Transportation Corps truck units down to and including the company. This equipment should be of the two-way, variable frequency, voice communication type with an operating range of between 50 and 75 miles.

k. Instruction in motor transportation be included in the curricula of all special staff and appropriate service schools.

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CHAPTER 4

THE MILITARY RAILWAY SERVICE

SECTION 1

OPERATIONS IN THE UNITED KINGDOM

78. Activation and Mission. The operations of the Military Railway Service in the European Theater of Operations began with the arrival in the United Kingdom of the 761 Engineer Railway Transportation Company during September, 1942. On 16 November 1942 all personnel assigned to the Railway Transportation Service of the Corps of Engineers were transferred to the Transportation Corps, to which had been assigned the mission of operating all military railways. The original mission of the newly activated Military Railway Division of the Transportation Corps concerned principally the procurement and training of railway troops, and the design and procurement of railway equipment for use in the United Kingdom and later on the Continent.

79. Railway Situation in the United Kingdom in 1943.[1] During the massing of United States Forces in the United Kingdom, the British railway service was seriously handicapped by shortage of both labor and equipment, as a result of the war effort. In order to alleviate this condition, the Military Railway Service took over the task of operating switching engines and yards at two United States depots. Before long, additional depots were provided with units of the Military Railway Service for yard operations. By October, 1943, the duties of the Military Railway Division included the operations of all United States depot switching. Main line operations, however, remained the responsibility of the British civilian railroads.

b. A critical situation existed in the supply of freight cars and locomotives. It had been estimated that 400 freight locomotives and 2000 freight cars would be required to meet the additional demands arising from the presence of the United States Forces. In order that the minimum of difficulty be encountered in their operation, the freight locomotives provided by the United States were all of a British type, but of American manufacture. All locomotives, were procured under Joint Stock-Pile agreements. These agreements permitted the use of equipment "earmarked" for the United States Forces in non-tactical operations in the United Kingdom, "recall" provisions insured its return on 14 days notice when Continental operations required. By January, 1944, the freight car assembly program, initiated early in 1943, had reached a level of production that permitted substantial releases to the British railways.

80. Assembly of Railway Troop Units.[1] During 1943, few military railway troop units had arrived in the United Kingdom. Practically all of the earlier and well trained units had moved into active Theaters of Operations, directly from the United States. The 761 Company, much depleted by the deployment of two thirds of its strength to North Africa, was the only operating unit present. In mid-July 1943, the 729 Railway Operating Battalion arrived in the United Kingdom. All military personnel present in the United Kingdom having civilian railway experience were transferred to this unit, raising it to full strength. By December, 1943, there were elements of three Railway Operating Battalions and two Shop Battalions present in the United Kingdom. By the end of March 1944, the Headquarters of

the 2 Military Railway Service, with the mission of operating the railways on the Continent, had arrived in the United Kingdom.

SECTION 2

OPERATIONS IN NORTHERN FRANCE AND BELGIUM

81. Planning for Operations.

a. The planning for Continental operations of the 2 Military Railway Service was divided into two definite phases. The first phase, during which the Military Railway Service was a part of Advance Section, Communications Zone, would require little operational activity other than reconnaissance and survey of existing railway plant uncovered by the assault operation, but would involve extensive repairs.[2] The second phase would concern the logistical support of the Armies and the operation of all railway facilities and their repairs.[1]

b. From D-Day to D + 41 the plan for railway operations envisioned the following:

(1) Development and operation of all railway trackage uncovered by the advance of the Armies, and captured and/or recovered equipment.

(2) Movement of railway rolling stock for unloading at Cherbourg on or about D + 25.

(3) Repair of rail facilities south of Cherbourg on about D + 30 with the extension of trackage south toward Brittany and eastward to Caen (VU 0567) as rapidly as the military situation would permit. Troop units scheduled for these operations were phased to arrive in the course of operations up to D + 41, and included one railway grand division, two railway shop battalions (lacking one company), and two railway operating battalions. Five Engineer General Service Regiments and three Dump-Truck Companies phased to arrive on the Continent between D + 8 and D + 25, were also assigned for those operations.

c. In planning for operations subsequent to D + 41, the railway program followed the phased advances closely. By D + 120, it was planned to have a double track railroad operating out of Cherbourg (VO 1522) as far east as Dreux (VR 3135). A single track railroad was planned south of Lison (VT 5378), via St. Lo (VT 4963) and Avranches (VT 2817) to Dol (VS 9803), and from there, double track to Rennes (VY 0155). From that point double track lines were planned to Chartres (VR 3902) and to the Brittany ports of Vannes (VH 1707) and Lorient (VG 7321) presumed to have been captured some time prior to D + 90. The lines were to be pushed eastward to the German frontier as the tactical situation developed.[1]

82. Progress in Early Operations in France.

a. The advance detachment of the 2 Military Railway Service landed on Utah beach on 17 June 1944, (D + 11) and began reconnaissance of rail lines in the Carentan (VT 3984)-Isigny (VT 5085) area. Rail facilities were not damaged as much as had been anticipated. Considerable quantity of rolling stock was captured intact including a complete modern passenger train of the "stream line" type. Reconnaissance parties moved over all rail lines within the lodgement area, but until after 26 June 1944, they could go no further north

than Valognes (VO 2508). On 3 July 1944, Headquarters of the 2 Military Railway Service was opened at Cherbourg (VO 1522). Repair of the rail facilities began about 1 July 1944. Civilian labor was available but was mostly unskilled.

b. The lack of damage to the main line between Lison (VT 5378) and Cherbourg allowed more time for work in Cherbourg itself, which was badly damaged. Damage to the marshalling yards at Carentan (VT 3984) and Lison (VT 5378) was severe and supplementary yard facilities were required at Couville (VO 0914) to permit the proposed development of Cherbourg. Earliest possible provision for the reception of the car-ferries was necessary since two Sea Trains were waiting at Cardiff (VT 6297) carrying American train equipment for early movement to France.

c. The shortage of railroad construction tools and the inadequate training of railroad construction units was a matter of deep concern to the Engineers prior to opening of operations.[2] The delay in moving troops into the Cherbourg area, occasioned by the tactical situation, was further complicated by the failure of arrival of tools and equipment. The track material which arrived lacked certain critical parts. Compensating for this, however, some railroad tools and track materials were found locally.[2] By 31 July 1944, reconstruction of 126 miles of track and four bridges had been accomplished and railway reconstruction in Cherbourg (VO 1522) practically completed. In all essential elements, the rail situation was not unsatisfactory in consideration of tactical progress. Supply was not yet satisfactory, necessitating considerable requisitioning of track material from local sources. Difficulties in sorting rail equipment because of the unfamiliarity of depot personnel, contributed to supply difficulties. (See Map, Appendix 2).

83. Operations Subsequent to the St. Lo Break-through.[1] The speed of the advance and the sudden change in direction of the main effort required changes in plan. The reduction of the Falaise (VU 1436) pocket permitted the use of rail facilities denied prior to mid-August, 1944, which had prevented the planned extension of the railroads to the east. By 31 August 1944, the tonnage was 3,360 tons per day, the average car loading was 11.5 tons, and the average distance moved was 33.5 miles. About 450 locomotives and 4,950 freight cars of all types from United States sources, were available and about half as many freight cars and a few locomotives had been recovered. Landing Ships Tank altered for the purpose, had greatly increased the capacity provided by the Sea Trains for the movement of rolling stock from the United Kingdom to the Continent.

b. In the 50 days following the St. Lo (VT 4963) breakthrough, advance was at the rate of almost 10 miles a day. To provide for this rapid advance, rail reconstruction was given top priority. By 15 August 1944, a single track railroad extended to Le Mans (VV 4161) and by 1 September 1944, to Paris (VS 0544). Trackage in operation was 4,788 miles, daily tonnage movement east of Normandy was 11,830, the average tonnage per train was 351, and the average distance travelled was 201 miles.

84. Railroad Reconstruction Troops.[2] It was during this period that the plan for assigning specific Engineer units to operate in the rear of each field Army came into existence. The Advance Section of Communications Zone, concerned over the rapidity of the advance and the uncertain performance of Engineer units assigned to perform all construction work within an area, activated three Engineer groups designated A, B and C, with the specific mission of railroad construction. Each group consisted of an experienced Engineer General Service Regiment, with one or more other units attached. One group

was assigned to each of the First and Third Army rear areas, and the third was deployed in support of the other two. When the Ninth Army became operational, the third group was designated for its support, and other units took over responsibilities in the rear. This plan was highly effective. It indicated the value of close Engineer support of railway activities. In the 50 days following the breakthrough at St. Lo (VT 4963), 3,355 miles of track and 36 bridges, totalling 4,700 lineal feet, were reconstructed. These operations extended as far north as the Meuse River at Liege (VK 4727) and east to the German frontier. (See Map, Appendix 4)

85. Problems in Early Operations. In the operation of railways in the early part of the campaign in Europe, many difficulties made their appearance. They included the following:

a. Allied air bombing had been concentrated on marshalling yards and major terminal facilities. In all cases, where Military Railway Service units took over new sections of railways, the yards were badly damaged. In order to use potential capacity, reconstruction of those yards was necessary. Labor and material requirements were considerably greater than for the reconstruction of main-line trackage.

b. There was a lack of experienced operating and supervisory personnel. The critical shortage in railway personnel in the United States required the retention of the maximum number there and Selective Service could provide only a small fraction of experienced men needed. The average Military Railway Service unit had less than 15 per cent of its personnel of "operating calibre" judged by normal standards.

c. Lack of adequate communications was common.[4] The usual practice was to string a single "pair" along the railroad right-of-way, using whatever support was available, on the ground in many instances. Accidental wire cutting, or deliberate in some instances by German stragglers, caused many train delays. It was not uncommon to see three or four trains backed up at one station, awaiting orders. The use of motor couriers helped to some extent, but was not conducive to effective dispatch. This situation was especially critical in single track operation. The frequency of accidents caused by reason of insufficient signal communication, in the absence of the conventional visual system or headlights on the locomotives, made it necessary to stop counter-movement on single track lines, thus substantially increasing "turn-around" time of cars and locomotives.[4]

d. Shortages in tools and equipment for maintenance was a serious handicap to operations during July and August, 1944. Units had departed from the United Kingdom in such haste that the equipment had to be left behind with the understanding that they were to be forwarded later. The generally confused dump situation on the Beaches hindered prompt receipt.[4] This was partially compensated for by the discovery of some tools in abandoned German installations and existing French shops, and by the use of expedients.

e. Until it was possible to echelon Railway Operating Battalions in depth to permit point-to-point operation by train crews, there was considerable difficulty through over-extended runs by single crews. This, of course, was a product of tactical operations, and could not have been entirely avoided, although better management by the unit commanders could have minimized this condition.

f. It was discovered that trains were badly over-loaded due to the attempts of Movement Division of the Chief of Transportation's office to dictate train composition without knowledge of actual rail-

way capabilities. The procedure was changed so that Movement Division would specify tonnage, classification, destination, and time of arrival desired and Military Railway Service would make up the trains.[4]

g. Lack of knowledge of the characteristics of the road, such as grade, curves, road-bed conditions, and switching were responsible for a considerable portion of operating troubles. This knowledge could be obtained only by experience.

h. In early September, 1944, the first of the transfer points for the transfer of truck cargoes to freight cars for further movement forward was established. These were necessary because of the far greater rail capacity east of Paris (VS 0544) than west of that city. It was necessary to move the bulk of supplies by truck from Normandy until rail repair permitted through car movement. The first of the transfer points was established at a point just outside of Paris. These installations and the responsibility for their operation were not provided for in the plan. When the need arose, they were organized and placed in operation without much delay.[2]

86. Return of Railway Facilities to French Operation.

a. In the last week of September, 1944, 58 per cent of total deliveries to Army dumps was made by rail and the trend was rising. The lack of convenient port facilities north and west of Paris and the limited amount of trackage were still the cause of the greater part of logistical troubles. The rail lines east of Paris were in relatively good condition as far as the German frontier. They had been adequately maintained by the Germans, for the transportation of material used in preparing frontier defense works. Time had not permitted extensive damage in the retreat. Allied bombing had been concentrated principally in the area west of Paris. In general, the railroads were then in a more favorable condition for supporting operations.

b. It had been planned to return operational control of railroad facilities to the French to as great an extent as possible. A system of "phase" operations had been established by Supreme Headquarters, Allied Expeditionary Force.[5] Briefly, the plan provided that Phase I operation would be exclusively military, assisted by the French through liaison officers and such technical personnel as were available. Phase II would be military control with active participation by French railway organizations as they became operational, with progressive delegation of functions to them. Phase III would be that of full assumption of responsibility by the French with Allied liaison through commissions for co-ordination. With the intention of providing every assistance possible to the French, it was arranged in October, 1944, to return the line extending from the Brittany Peninsula through Rennes (VY 0155) and via Le Mans (VV 4161) to Paris, first under Phase II operations and, as soon as possible, under Phase III. This permitted the resumption of movement of food supplies to the Paris area, then commencing to feel the pinch of hunger. Liaison offices were established in Paris to co-ordinate French/Allied rail movement. It was during the early phases of joint operation that the failure to provide bi-lingual documentation showed evidence of trouble to come.

87. Extension of Activities East of Paris.

a. In mid-October 1944, critical shortages in ammunition and gasoline had caused the Allied offensive to come to a halt just at the German frontier.[2, 4] The static conditions then prevailing,

favored continued railroad repair and extension. By November, 1944, while rail shipment originating in the Cherbourg (VO 1522) area remained relatively constant, the effect of the opening of Le Havre (VL 4027) and Rouen (VM 2817) was noticeable. Up to 31 December 1944, there was little change in rail shipments from the ports, but there was a substantial gain in shipments to the Armies. Antwerp (VJ 6795) had been opened on 27 November 1944, and large tonnages were moved from it into the Liege (VK 4727) area. Rail movement in Liege was handicapped because of destruction of all but one bridge over the Meuse River. Construction of a second bridge was not completed until late in January, 1945.

b. In the Verdun (VU 2766) area, where important Ordnance and Quartermaster base depots were located, the limited track siding together with a heavy volume of traffic made it necessary to side-track cars to areas to the rear of Verdun with resulting congestion and delay in unloading. Two plans for the relief of this congestion were prepared, one for routing Ordnance supplies around Verdun and the other for the establishment of a Provisional Traffic Regulating Station in the Oise Intermediate Section where Quartermaster supplies destined for Verdun were to be classified. This station was to furnish information on all supplies destined for the Verdun, Nancy (VU 8512), Thionville (VU 8688) area before forwarding them from Chalons-Sur-Marne (WT 5445), where adequate marshalling yard facilities existed. When these plans were put into effect, the difficulties were largely overcome.[2]

c. As the Allied Armies approached the German frontier, prepared demolitions and track destruction by the use of the "ripper" which destroyed both rail and ties, began to appear, particularly east of Liege and in the vicinity of Nancy and Metz (VU 8657).[1, 5]

d. The German counter-offensive of December, 1944-January 1945, did little damage to railway installations, but caused a serious shortage of freight cars and barges, due to the retention in forward areas of approximately 35,000 freight cars for the evacuation of supplies and troops in case of necessity. By the end of January, 1945, the situation as to car shortages and back-logs in the ports had been cleared to a considerable extent. Railheads had been established close to the front lines. From that time on, rail support was adequate, and the resumption of the offensive was logistically possible. (See Map, Appendix 7)

88. Further Problems in Railway Operations.[6]

a. The expansion of the rail network west of Paris (VS 0544) had caused the personnel of the Military Railway Service to be extended to a degree not fully anticipated. It had been planned to return rail facilities to the French at an early date, and displace military units forward. With the principal source of supply still located in the Cherbourg Peninsula, and the difficulties in documentation under French operation, it was necessary to retain the northern lines into Paris under Phase I operation, in addition to all of the lines north, east, and south-east.

b. Delays in unloading trains at forward depots, and their retention as "rolling" supply bases, caused shortage of rolling stock. The situation became critical in mid-November, 1944, and a system was instituted of moving "selected" trains off the main line in order to employ their crews and locomotives in other runs. At one time, there was a train in every block from the Belgian Frontier to Namur (VJ 9611); and on another occasion, there were 30 loaded trains, from which power and crews had been released at the French side of the Belgian frontier for acceptance by Belgian crews.

c. Inexperience on the part of operating personnel added to the difficulties inherent in hastily repaired facilities. In the Normandy Base Section, up to the end of November, 1944, the following main line accidents were reported:

(1) 29 derailments due to settling of track on filled in craters, switch points not closed and unfamiliarity with French type manually operated switches.

(2) 29 rear-end collisions, due to inadequate protection of rear of train in block by trainmen, and locomotive engineers not having control of train in occupied block.

(3) 7 side-swipe collisons due to inexperience in train control in switching operations.

d. Headquarters, Normandy Base Section, reported much pilferage of goods from trains. The situation became so serious that it was necessary to withdraw a battalion of the 104 Infantry Division to provide train guards. Lack of adequate Military Police units, all of which were employed in traffic control, and area security, made this necessary. No provision had been made for train protection by Military Police. Similar conditions existed in the Channel Base Section, and port troop units of the Transportation Corps were used for train guards.

e. Railway tracks had been laid on the ground without proper ballasting in some cases, particularly in the Le Molay (VT 6677) yard. During the rainy weather, in the fall of 1944, the ground settled. In one day at the Le Molay yards, within one eight-hour period, there were 21 derailments from this cause. Some of this trouble stemmed from failure to complete drainage arrangements.

f. The placing of practically all dumps in the Normandy area in open fields, many of which were not provided with adequate roads, caused delays in train movements up to 24 hours by reason of trucks being mired.

g. In the Brittany Base Section, troubles were experienced when the rail facilities were turned back to French control (Phase III) operations. The French were inclined to give priority to the movement of food into the Paris (VS 0544) area, where the food situation was admittedly critical. Much tact and good humor was required to adjust these difficulties.

h. Documentation was unsatisfactory. Seine Section reported trains arriving in Paris with no address of destination other than "RTO PARIS," especially during the first two or three weeks after its liberation. Shipments were also misdirected because of lack of knowledge in the field units of the whereabouts of depots. Oise Section reported lack of movements information in that the sections in which movements were initiated failed to pass on the information necessary to expedite forwarding. Lack of uniformity in the forms used for reporting operational information, caused confusion. This was corrected to some extent by the issue of Circular 13, Office, Chief of Transportation, Communications Zone, directing uniformity in forms and procedures.

i. The moving of United States cargoes in complete trains over French operated railroads in order to minimize the misdirection of critical material, required more switching operations than would have been required, had military control been exercised or had French railway methods and records been trustworthy.

j. The inability of the Paris depots (VS 9544) to receive the volume of freight forwarded caused the accumulation of cars in and around the Paris yards, while shortages existed at the ports. This condition, however, was not of long duration.7

k. Shortages in signal equipment and lack of time resulted in the provision of only the minimum of facilities. Of the five circuits deemed necessary for efficient operation, only the dispatcher's circuit and message circuits were scheduled for priority rehabilitation. The provision for 10 long-range mobile radio sets used for command control purposes, avoided some of the difficulties which would have arisen. The use of "off the main line" trackage, to by-pass heavily damaged installations, made the communications problem a major difficulty.

89. The "Toot Sweet Express." [2] In order to expedite the movement of high priority freight from the Cherbourg (VO 1522) area, a railway operation similar to the Red Ball motor express was instituted. The plan contemplated a 20-car train leaving Cherbourg for Paris daily; at Paris, additional cars were to be added and two trains of 20 cars each, one for movement to Namur (VJ 9611) and the other to Verdun (VU 2766), were contemplated. Bids for space were to be submitted to Headquarters, Communications Zone, in Paris by 1600 hours for freight to be dispatched from Cherbourg on the following day, and by 1000 hours for freight out of Paris. Special equipment was used and could not be reconsigned. The running time was fixed at 36 hours. Unloading was to be accomplished in six hours, and the train was to be ready to return in 12 hours. Truck capacity was to be used for trans-shipments in the Paris area. Service was planned to start during the week of 15 January 1945, but was postponed for lack of bids for space until 20 January 1945. During the first week of February, 1945, numerous trains were cancelled for the same reason. Shortly thereafter, however, the Armies' requirements increased. Weekly tonnage rose from 1,950 in the first week to 3,500 tons in the week of 13 March 1945, corresponding to full capacity. The northern destination was changed from Namur to Liege (VK 4727).

90. Hospital Trains. Specially equipped hospital trains, adapted from British equipment, were assembled in the United Kingdom for early movement to the Continent. Prior to their arrival, ordinary French box-cars furnished with hospital equipment were used. By 1 October 1944, there were 14 hospital trains in use and 31 by the end of 1944. Almost 200,000 casualties were evacuated by 31 December 1944, in 633 trains. Hospital trains were under the command of the Chief Surgeon, and technical operation and stabling were the responsibilities of the Chief of Transportation. Movement schedules were established on the basis of requisition from the Theater Surgeon and forwarded to the Base or Intermediate Section in which the movement would originate. When French operators and train crews were required, requests were placed through liaison officers. These trains were dispatched over the entire distance to be traversed, without reference to changes in jurisdiction at various points in the route. The running time between Paris and Cherbourg, the principal port for the evacuation of casualties, was reduced from 18 to 12 hours. They were dispatched so as not to interfere with the movement of military cargo.

91. Leave Trains. During the month of December, 1944, the first program for the accommodation of leave personnel, principally for movement to the Channel Ports for transportation to the United Kingdom, came into existence. Of principal concern to the Military Railway Service was the establishment of leave trains operating from forward areas to Paris. By February, 1945, this traffic had grown to substantial proportions. With the establishment of leave areas in the

South of France, Brussels (VJ 6355), and Paris (VS 0544), a substantial portion of the passenger traffic of the railways consisted of personnel on leave and furlough. It was felt that the morale value of reasonably good accommodations warranted the use of the best available equipment. Three trains daily were operated between forward areas and Paris, accommodating an average of 3,000 persons each. As the strength of the Armies increased on the Continent, permitting larger percentages of the personnel to be released for short periods of rest and recreation, the leave traffic increased and more trains were provided. Since it was not practicable to provide messing arrangements and sanitary facilities on the trains, it was necessary to establish stops en route. Some difficulty was experienced with leave trains consisting of relatively modern equipment, arriving from Germany. The re-routing of cars from such trains to French passenger service occurred in some instances. Representations were made to the French railway authorities and some improvement was noted. At no time, however, did such diversions jeopardize the continuance of the leave program, since in most cases, the cars were returned.[3]

SECTION 3

OPERATIONS IN SOUTHERN AND EASTERN FRANCE

92. Early Operations.

a. The speed of advance of the combined United States and French Armies up the Rhone River valley was as rapid as the expansion of the Normandy beach head was retarded. From the initial landings on 15 August to 19 September 1944, when Seventh Army Headquarters was opened at Vesoul (WO 9798), east of the Belfort Gap movement was almost continuous. The main railway routes paralleled the Rhone River, and extended northward through Lyon (WX 9578) and Dijon (WO 0461). Another route, on the east bank of the river, extended north to Valence (VO 0295), where a branch line passed through Grenoble (BJ 6526) and Bonez, then continued north to a junction with an east-west line to Dijon. Further extensions existed toward Nancy (VU 8512), Metz (VU 8657), Sarrebourg (WQ 5015), Strasbourg (WW 0990), and Mulhouse (WV 7002). (See Maps, Appendices 7 and 8).

b. Reconnaissance had indicated extensive damage to bridges along the west bank of the Rhone River. The railroads on the east bank, however, were less damaged, and they were soon serving as the main supply route to the north. The line through Grenoble was usable, but the mountainous nature of the terrain in that area indicated probable denial during the winter months because of snow conditions. Rail operations started by the movement on 17 August 1944, of a small quantity of supplies from the beach area at St. Tropez (BU 4917) over the narrow gauge line in that area. By D + 5, three trains per day were moving cargo to St. Maxine (VU 4922). The first standard gauge railroad was opened from St. Raphael (BU 5833) to Aix-en-Provence (BT 5242). The line north to Grenoble was open except for two bridges —one across the Durance River at Meyrargues (VT 5854) and another across the Buech River at Sisteron (BO 8817). Temporary bridges were provided at both of these crossings, permitting the movement of freight cars only, opening on 21 September 1944, with a daily movement capacity of 1,500 tons. An intermediate trucking operation from Meyrargues (VT 5854) to Sisteron (BO 8817), where the freight was transferred for movement by rail to Grenoble, then a rear Army maintenance area, was established. By 25 September 1944, the line on the east bank of the Rhone River was open to Lyon (WX 9578), with a daily capacity of 3,000 tons, and the line from Valence (VO 0295) to Grenoble with an equal capacity.

c. The first meeting was held on 26 September 1944 for the receipt of bids to establish priority of movement. The bids received totalled 8,433 tons, of which only 4,933 tons could be accepted. As the rail lines were repaired and more rolling stock became available, the capacity increased. By 12 October 1944 (D + 58), the bids accepted totalled 12,000 tons daily, and by 16 November 1944 (D + 93), 14,000 tons. By 26 December 1944, (D + 133), bids were accepted for 15,000 tons daily. For the period 2 October (D + 48) to 31 December 1944 (D + 138), an average of 664 freight cars were forwarded daily from Delta Base Section to Continental Advance Section, and from there, an average of 557 were forwarded to the Armies. During this time, rail connections had been extended as far north as Metz (VU 8657) and Sarrebourg (WQ 5015), and to a point just south of Sarraguemines (WQ 5056).[8] The relatively static tactical situation which existed up to the end of March, 1945, permitted the continuance of railway repairs in preparation for the support of a new offensive. No major changes occured in the railway network under the jurisdiction of the Military Railway Service up to February, 1945, at which time the two Military Railway Services operating in France were consolidated.

93. Problems in Military Railway Operations in Southern and Eastern France.

a. When Southern Line of Communications came under the jurisdiction of Communications Zone, European Theater of Operations, on 20 November 1944, the northern and southern groups of Armies had effected a junction and were under one command, both tactical and logistical. The military railways in Southern and Eastern France were operated by the organization later known as the 1 Military Railway Service. Certain features of its organization were:

(1) The Director General, Military Railway Service, was directly responsible to the Commanding General, Southern Line of Communications, in all matters affecting the operation and control of railways.

(2) The Military Railway Service was a separate command, and as such, troops of the other Arms and Services were assigned or attached for the accomplishment of its mission.

(3) The Director General, Military Railway Service, was responsible for railway construction and reconstruction, and Engineer troops were assigned for such operations.

(4) The Military Railway Service was responsible for the procurement, storage, and issue of railway supplies and equipment, including track and construction material, normally supplied by the Corps of Engineers. Requisitions were processed by the Transportation Corps Supply Officer, and all the necessary administrative work was performed under his direction.

b. The responsibility of the Transportation Corps concerned movement programs only, and the Transportation Officer, Southern Line of Communications, exercised control only over requests placed with the Military Railway Service to insure that the capacity of the military railroads was not exceeded. In effect, this made the Military Railway Service responsible for all rail movements and their control, after the tonnage bids were allocated. This state of affairs, with practically the whole responsibility vested in the Military Railway Service and the Transportation Officer

being little more than an appendage, arose from the fact that the Military Railway Service had been a separate command in the Mediterranean Theater of Operations. The Transportation Corps, as represented by the Transportation Officer, Southern Line of Communications, did not have the authority to weld all forms of transport into an integrated system, and the Military Railway Service had to provide within its own organization a traffic control system which had approximately the functions served, in Northern France, by the Movements Division and the Rail and Road Transportation Offices.

c. In analyzing operations, there appears to have been no substantial gain from the fact that the Military Railway Service was responsible for movement control. Car shortages existed; back-logs built up because of failure to call cars forward; and the Armies retained cars for "rolling reserves" in much the same manner as in the North.[8] The Priority of Movement meetings held three times monthly, served only as a medium for translating railway capacity into a tonnage movement program. Requests for freight cars were made by the Services directly to the Military Railway Service. One advantage, however, derived from the plan according to which traffic control personnel for station and yard was integral with the Railway Operating Battalion. This situation is similar to civilian railway practice.

d. The opening of a Railway Traffic Regulating Station at Is-sur-Tille (WO 0984) in February, 1945, was the first step toward assumption by the Transportation Officer, Continental Advance Section, of his normal traffic regulating functions. This was occasioned by the necessity for clearing a major back-log of freight cars, then awaiting forward movement at that point. The location was well chosen because of the existence of extensive marshalling yards which would permit classification of cars and the making up of commodity or standard trains.

e. In railway operations in Southern France, adequate signal communications were provided at an early date. A special feature of communications was a wide-spread radio network. Nine stations were in operation, all in important control centers. Teletype service between forward and main headquarters was also established before the end of January, 1945.

f. Most of the difficulties which arose in the operations of the railways were a result of too great a tendency to adhere to civilian practices. In a civilian railway system closely kept schedules do not require movement control procedure, other than normal dispatching. The customers are aware of the schedules and govern their actions accordingly. For those to whom commodity loaded cars are consigned, an occasional special train may be required, which does not create serious problems except on the heavily travelled passenger lines. Military operations differ in that special trains are more often required than "scheduled" trains. Types and quantities of commodities are subject to almost daily change. The nature of operations, and the rate of progress on the fighting front, governs requirements. Civilian railroad traffic departments prepare freight capacity requirements based on firm commitments —more often than not, long term contracts. Demurrage charges discourage car hoarding. Receiving depots are usually adequate for the prompt reception, unloading, and return of cars. These circumstances seldom occur in military operations.

g. The agency responsible for planning the use of all forms of transportation, and for carrying its program into effect for the purpose of supplying the Armies, should have sufficient authority to control all forms of transportation. In military transportation, the

railways are properly viewed as one link in a system of transportation that needs to be an integrated whole. There are many civilian precedents for such centralized control; for example, the eastern railroads serving New York City which operate bus lines to ferry terminals, ferry boats to rail terminals on the opposite bank of the Hudson River, and train service to the suburban communities in North Central New Jersey. The bus and ferry schedules are co-ordinated with train schedules. They are owned, operated, and controlled by one organization—the railroad which provides all accommodations. In military railway operations in Southern France, the railways were in a relatively autonomous position; they were subject to a centralized control, but control was centralized merely for the railways and not for the transportation system as a whole.

94. Supply Functions.

a. In the Southern Line of Communications, Engineer supply functions, including procurement, storage, and issue of all railway construction and bridging materials, were retained by Military Railway Service.[1] The normal supply activities incident to the procurement of locomotives, freight cars, auxiliary equipment, spare parts, and other items common to railway supply and maintenance, were also the responsibility of the Military Railway Service. The facilities of the supply organization of the Transportation Corps were used in the preparation of necessary documentation, including control and expediting procedures.[9] In Southern France, depots were established for railway material only, while the Supply Officer of the Transportation Corps for the Southern Line of Communications exercised normal supply responsibility other than depot operation, including stock control. Depots were operated by the Depot Companies then organic to the Military Railway Service. Most of the Transportation Corps items were critical, and receipts of locomotives, freight cars, and spare parts were slow. The existence of a reasonably good stock of captured enemy equipment enabled the early operation of railway facilities that would otherwise have been denied. During January, 1945, the assembly of freight cars was begun by the Military Railway Service in Southern France, with a goal of 100 cars daily.[8]

b. There is no good reason for the maintenance of a supply organization by the Military Railway Service, separate from that of the Transportation Corps. Depot segregation, however, is desirable and technical assistance for the identification of material is necessary. Analysis of military railway operations indicates that is is necessary to maintain stocks of maintenance of way equipment, particularly ties and switch gear, in convenient local dumps, rather than to rely on shipment from Engineer depots. This was fully appreciated in the re-organization of the Military Railway Services under limited exempt status.[10] Long delays occurred in Northern France in obtaining track materials from Engineer depots, which were often located at considerable distances from the areas requiring such material. During February and March, 1945, an officer of General Headquarters, Military Railway Service, spent several weeks locating critical track equipment in Engineer Depots all over Northern France, Belgium, and Western Germany.[3] The inability to identify these parts was the principal reason for delay in shipment. The relatively effective performance of the supply organization of the Transportation Corps in obtaining tools, and replacement and construction parts for locomotives, freight cars, and track, in the face of critical shortages then existing in the United States, served to demonstrate the soundness of its organization and procedure.

SECTION 4

THE FINAL PHASE OF RAILWAY OPERATIONS

95. Improvements in Supply Movement. The period preceding closure to the Rhine River had been characterized by effective rail supply movement. During this period, documentation had improved considerably, and operating personnel had greatly benefited by the relative static operations, enabling the accumulation of experience and knowledge as to procedures. (See Map, Appendix 7). The establishment of from one to three consignment points in the rear of each of the Armies had simplified control in rail movements.[1] These consignment points consisted generally of a railhead with adequate marshalling yards at a junction point. Because of the adequate communications then existing, it was possible to provide timely information from these points to the Regulating Stations of Advance Section, Communications Zone, which in turn kept their respective Armies informed as to the supply status. Frequent changes in location of the consignment points, often on short notice, required the maximum of co-ordination between the agencies concerned. Upon a change in location, a multiple address message originating with the Assistant Chief of Staff, G-4, Advance Section, Communications Zone, kept all agencies advised. Later, Headquarters, Communications Zone, directed that such messages be addressed to the Chief of the Transportation Corps only, who was responsible for further dissemination. This procedure, however, was not satisfactory, as it introduced another stage in the transmission of information, which caused delays.[2]

96. Engineer Operations in Support of Rail Activities.

a. The plans for the support of a new offensive to the Rhine River and beyond were developed during November and December, 1944. With reference to railway activities, the plans centered about the rapidity of reconstruction of railways uncovered by the advance. Fabricated steel members for bridge construction were available up to one meter in depth and were capable of being produced in Belgium.[2] The planning for Engineer assistance included the provision of a double track line, and a single track bridge over the Rhine River in each of the three Army zones.[2] The Ninth Army was to provide the line Aachen (VK 8443) -Wesel (RA 2241) -Muenster (RA 9374), with a bridge at Wesel. The First Army was to provide the line Aachen (VK 8443) -Duren (WF 1436) -Cologne (WF 4650), with a bridge at Cologne (WF 4650). The Third Army was to provide a line from Thionville (VU 8688) -Trier (WL 2129) -Coblenz (WF4650), with a bridge at Coblenz. It was contemplated that truck delivery would furnish initial movement into Germany, using conventional military bridging constructed for vehicle traffic.

b. As operations progressed, the Engineer Group organizations, which had previously been assigned railway support missions, were continuously engaged in carrying out the plans. Reconstruction of the railroad bridges over the Roer River was begun by Group A near Baal (VK 9872), and by Group C near Duren (WF 1436). Both bridges were open by 11 March 1945. By 5 March 1945, the 1056 Port Construction and Repair Group, which had completed the bridge over the Meuse River at Maastricht (VK 5553), was assigned the mission of opening the line from Baal via Muenchen-Gladbach (WF 0888), and Krefeld (RA 1604), to Geldern (RA 0126) and prepared for the extension of this line to the crossing site at Wesel. Group C began construction of the lines east from Duren (WF 1436) toward Cologne, but the capture of the Remagen bridge on 7 March 1945, required a change in priority to the line Duren -Euskirchen (WF 3329) -Bonn (WF 5537). The extended advance of the Third Army from Trier (WL 2129)

and then south to a junction with the Seventh Army, permitted further extension. Group B was given the mission of opening a line from Thionville (VU 8688) to the Bingen (WM 1142) -Mainz (WM 3657) area. Reconnaissance indicated that the line Thionville -Saarbruecken (WQ 4551) Bingen could be opened by the reconstruction of two bridges; one over the Saar River at Saarbruecken, and the other over the Nahe River at Bad Munster (WM 0838). Except for a small section of track between Falk (WQ 2071) and Saarbruecken there was no great damage. Work was begun without delay and the line was open by 1 April 1945. Material was assembled at once for the Rhine crossing at Mainz.

c. Due to excellent pre-planning and careful phasing of material flow, the Rhine River bridge construction proceeded on schedule. Working 24 hours daily, the 1,735-foot bridge at Wesel (RA 2241) was completed on 9 April 1945, in 10 days, four hours and 45 minutes. At Mainz, the spanning of 3,444 feet was required. This bridge was completed for traffic on 14 April 1945, 10 days, and 34 minutes after starting work. From Mainz the lines were opened at Kassel (RC 2003), Leipsig (AE 2314), Munich (WY 8456), and Nuremburg (WU 4200). At Duisburg (RA 3314), construction of a second bridge was initiated to supplement the Wesel bridge, then used jointly by the American and British Forces. This 2,815-foot bridge was completed on 8 May 1945, in six days, 14 hours and 20 minutes. It was an outstanding Engineer accomplishment in support of railway activities.[1] Two additional bridges were constructed over the Rhine River at Mannheim (WM 5300) and Karlsruhe (WR 4746) for the support of the 6 Army Group. At Mannheim construction under the direction of the Military Railway Service was started on the Ernie Pyle railway bridge, a timber pile trestle bridge, shortly after the initial crossing on 1 April, and was completed on 25 April 1945. The railway bridge at Karlsruhe was not completed until 15 May 1945.[2]

d. The agreed daily capacity of the two Rhine bridges at Mainz and Wesel was 10,000 tons each. Actually, as high as 13,590 tons were moved over the Mainz bridge and 16,720 tons over the Wesel bridge. The average movement over each bridge was about 8,000 tons daily.[2]

e. The relative construction records show better performance in the area of the northern group of Armies, where railway and bridge construction was solely the responsibility of the Corps of Engineers.

97. Rail Congestion at the Bridges.

a. The Mainz area remained a railroad bottleneck for a long period. Part of the trouble was due to the condition of the line from Saarbruecken to Mainz. Poor communications in the early stages, caused delays in calling trains forward, with resulting congestion beyond Saarbruecken. A further cause for congestion was the bridge at Hanau (WM 5571). Until continuity of traffic over this bridge was assured, cars were side tracked in the Mainz area. Also, the Third Army was inclined to retain cars as a rolling reserve, and tended to call forward selected freight rather than all that had been requisitioned. It was several weeks before the return flow of empties began to equal the loaded cars moving over the bridge. Another source of trouble was the multiplicity of agencies concerned in supply movement control, particularly since two Armies were using the bridge at Mainz. The two Regulating Stations, Headquarters of Advance Section itself, the two District Rail Transportation Offices, and occasionally even Army representatives, all exercised some sort of movement control. In addition, two Railway Operating

Battalions were concerned in the operation of the trains, introducing additional elements for confusion.[2]

b. To effect co-ordination, committees were formed of all interested agencies, and control points were set up, one at Thionville (VU 8688), later moved to Mainz (WM 3657) to control traffic over the bridge, and the other at Muenchen-Gladbach (WF 0888) to control traffic over the Wesel (RA 2241) bridge. The committees were able to correct the situation to a considerable extent, but the car return problem remained acute and was not corrected until after VE-Day. At one period the excess of loaded over empty cars reached 12,200 units. In order to accumulate empty cars, captured enemy material returning from forward areas was unloaded near the bridges. No provision had been made for the transit storage of this material since the car-hoarding had not been fully anticipated. It was again necessary to improvise unloading organizations, using Quartermaster Base Depot Headquarters detachments supplemented by prisoner-of-war and civilian labor detachments.[2]

98. Personnel Losses from Infantry Replacements. Early in February, 1945, in common with all Communications Zone troop units, the Military Railway Service lost technical personnel to be trained as combat Infantry replacements. Second Military Railway Service lost about 2000 men and the First probably as many. Replacements were furnished from limited service personnel, the bulk of whom had no previous railway experience. Fortunately, these losses were incurred late in the campaign.

99. Train Security. From the first, Military Police personnel was an organic part of the 1 Military Railway Service. The addition of four Military Police Battalions to the 2 Military Railway Service late in March, 1945, was a factor in the reduction of pilferage. Unfavorable publicity in connection with the trials of military personnel charged with rifling cars between stations had brought this matter forcibly to the attention of everyone concerned, and the inadequacy of train guards was obvious. A security Department was organized for the distribution of these units to suit operations. Additional troops were required, however, to provide the necessary security for rail facilities within Germany. Several anti-aircraft battalions were made available by 12 Army Group, together with Criminal Investigation Detachments, and deployed along the railway lines.[8]

SECTION 5

CONCLUSIONS AND RECOMMENDATIONS

100. Conclusions.

a. Experience levels in operating personnel generally, and in the junior grade supervisory personnel to a less pronounced degree, were not satisfactory. Lack of civilian experience in the operation of railway equipment was general.

b. Many of the difficulties that arose in the operation of military railways were the result of too close adherence to civilian railway practice without proper appreciation of military necessities.

c. The necessity for utilizing a much more complex network of track in Northern France than was anticipated resulted in creating a shortage in troop operating personnel.

d. There was a lack of Military Railway Service personnel

for the operation of railway stations and marshalling yards. For this reason Rail Transportation Officers had to perform these duties in addition to those related to their primary mission.

e. Early in the campaign, protection of material in transit to prevent pilferage was inadequate.

f. Experience indicated that the Corps of Engineers should retain responsibility for railroad repair and construction, with close co-ordination with the Military Railway Service to provide for the most suitable routes, stations, yards, and depot locations. Reconnaissance of railway facilities and installations was generally considered to be a joint responsibility.

g. Early in the campaign, military railway units were committed to operations without accompanying tools and equipment. This led to delay in starting railway operations.

h. There appears to be no justification for the existence of a separate supply organization within the Military Railway Service, other than for the storage and distribution of track material, and for maintenance of way and operational supplies. In the depots, there were difficulties in the identification of railway material.

i. Early in the campaign, adequate signal communications were not provided at the same rate as rail repairs advanced.

j. The installation of mobile long range radio equipment was of great assistance. About three of those mobile units proved to be sufficient for each Grand Division when deployed in depth.

k. Failure to supply headlights for locomotives resulted in a considerable number of accidents.

l. There was a pronounced tendency on the part of all the Armies to retain loaded freight cars as rolling reserves, contributing in a high degree to the shortage of empties.

m. The return of the railways in liberated countries to civilian operation, at a date earlier than anticipated as result of shortage in troops, did not result in a marked loss of efficiency. The problems which arose were due in large measure to language difficulties.

n. When more than one Military Railway Service is established, a General Headquarters is required for planning and co-ordination. An appropriate Table of Organization and Equipment was not provided. Officers for liaison assignments were not provided, except by borrowing from other railway units. There was also a need for map reproduction personnel for the preparation of railway maps.

o. There appears to be no justification for the existence of the Military Railway Service as a separate command, as it was to a major degree within the Southern Line of Communications. Its military purpose is the implementation of that portion of the supply movement plan for which rail transportation is available. The preparation, co-ordination, and integration of the supply movement plan is the responsibility of the Chief of Transportation. For the accomplishment of the mission established by those plans, both control and command of all of the functional and operational services of transportation, are required.

p. The form of exempt status for the Military Railway Service found most desirable provided for command by the Chief of Transportation through authority delegated to the Director General, who had complete responsibility for all operational control. Administrative functions, including court-martial jurisdiction, review of court-martial proceedings, fiscal matters, procurement, storage and issue of common items of supply, personnel accounting other than promotion, demotion, reclassification, assignment, and transfer of personnel, and special service activities, remained the responsiblity of area commands in which the units of the Military Railway Service were stationed.

101. Recommendations. It is recommended that:

a. The Military Railway Service be continued as an operational service of the Transportation Corps, under the command of the Chief of Transportation, with operational control delegated to the Director General, Military Railway Service.

b. When the operation of two or more Military Railway Services is contemplated, a General Headquarters be provided in accordance with an appropriate Table of Organization and Equipment, allowing for a map reproduction unit and liaison personnel when directed by the Theater Commander.

c. Existing Tables of Organization and Equipment for Railway Grand Divisions be amended to include reconnaissance personnel for the purpose of collecting intelligence relating to railways. This personnel should be trained in aerial map interpretation, appreciation of terrain features, and general railway construction requirements, and should operate in conjunction with Engineer reconnaissance parties.

d. The existing Tables of Organization for Railway Operating Battalions be augmented by suitable increments of personnel and equipment for the operation of railway stations and yards.

e. Authorized Tables of Organization and Equipment of Railway Operating Battalions be amended to provide for the assignment or attachment of appropriate security personnel to protect cargoes from pilferage. Sufficient personnel should be provided to man all the trains contemplated for operation by each battalion. Personnel should be trained in interior guard duty as applied to area protection and individual posts.

f. Service schools be continued in military railway activities for the purpose of training technical and supervisory railroad personnel, both officers and enlisted men. Further, that provisions include attendance by the maximum number of personnel from reserve components, provided these components are authorized by law.

g. An adequate trained reserve of military railroad personnel be provided and maintained. The training program for the reserve components should provide field experience in troop leading and military administration involved in the operation of military railways, in addition to technical training. Emphasis should be placed on co-ordination with other forms of transportation, and especially with movement control agencies.

h. Provision be made for joint Signal Corps-Corps of Engineer support in railway rehabilitation or construction to permit the earliest possible establishment of railway operations.

i. The Corps of Engineers retain responsibility for railway construction and reconstruction, other than normal maintenance-of-way, with joint responsibility with the Military Railway Service for railway reconnaissance. Responsibility for priorities in the reconstruction of railway facilities should remain with the Chief of Transportation. Responsibility for priorities in railway construction is a command responsibility of the Theater Commander, with the Chief of Transportation and the Chief Engineer in an advisory capacity. Responsibility for maintenance of way should remain with the Military Railway Service.

j. Consideration be given to establishing such doctrine concerning the employment of Engineer general service troops as to require specialized training of units committed to railway construction and/or reconstruction.

k. The Military Railway Service be authorized to store and distribute such quantities of track material as may be required for maintenance of way operations and items of railway operating supplies, the use of which requires immediate access.

l. Authorized Tables of Organization and Equipment for Headquarters, Military Railway Service, and of Railway Grand Divisions, be amended to include provision for mobile, long range, two-way, voice radio equipment, with operating personnel, on a basis of one unit per Headquarters, Military Railway Service, and three units for each Railway Grand Division.

m. The Military Railway Service be granted an exempt status to include command functions over all personnel and units assigned or attached, but exclusive of area command responsibilities.

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CHAPTER 5

THE INLAND WATERWAYS DIVISION

SECTION 1

ORGANIZATION FOR OPERATIONS

102. General. During the planning stage which preceded Allied military operations on the Continent, the use of the inland waterways systems of France, Holland, Belgium, and Germany was not anticipated in the over-all transportation system which was envisioned. During the fall and winter months of 1944, however, developments in the tactical situation made it essential that this means of transporting supplies and equipment be exploited to the fullest extent in order to help relieve congestion and the overworked truck and rail facilities.[1] After approximately seven months of use prior to VE-Day, despite extremely adverse weather conditions, personnel and equipment problems, and the damage caused by enemy demolitions and aerial bombings, it became evident that while the 'creeping barge,' as an individual carrier, could not compete with the railway car or the truck, yet, once the 'pipeline' was filled, the barge was a substantial adjunct to the rail car and the motor truck. The problems involved were centered about making the inland waterways navigable and controlling the barges.

103. Inland Waterways Systems on the Continent. The canals of Belgium do not, as in France and Germany, form a network which permits transit between any two given points in the country. The inland waterways of Belgium fan out as individual canals from the major ports. During peacetime, they handled approximately 30 per cent of the total volume of traffic. There were 1,081 miles of waterways in Belgium, as compared to 6,306 miles of railways and 6,485 miles of highways. The inland waterways on the Continent are mainly navigable rivers running in a north-easterly direction. All are linked internationally, thus making them ideal for the transporting of supplies from ocean ports to the innermost parts of the Continent. As an example of their potentialities, the Belgian inland waterways in 1939 had a volume of traffic of 2,930,599,000 kilometric tons. The greater part of this traffic consisted of bulky raw materials.[1] Before the war, civilian firms, backed by governmental decrees, administered and maintained the canals and navigable rivers of France, Belgium, and Germany. These firms, with years of practical experience, were familiar with the various conditions and problems in the operation of their inland waterways, but the war completely disrupted the organizations in France and Belgium. It was necessary in those countries to enforce regulations rigidly in order to insure the re-establishment of these civil agencies.[1]

104. Organization of Inland Waterways Division.

a. On 7 November 1944, the Inland Waterways Division of the Office of the Chief of Transportation was activated. Prior to that time, all matters pertaining to inland waterways on the Continent were handled by an Inland Waterways Committee, Headquarters, Communications Zone, composed of representatives from the Office of the Chief of Transportation, Office of Chief of Engineers, and G-4 Section. This committee had been appointed on 13 September 1944 by order of the Commanding General, Communications Zone, for the purpose of effecting reconnaissance, reconstruction, and operation of the inland waterways on the Continent. Under this order, the Chief of Transportation was responsible for supervising the operation of all inland waterways in the United States area of operations on the Continent.

b. The mission, duties and responsibilities of the Inland Waterways Division were stated to be: "This Division will assist the French, Belgian, and Dutch Governmental Canal Agencies to open their respective canal systems, see that the equipment needed to repair these canals is used to the best advantage, and co-ordinate the canal systems of these various countries so that barge traffic will not be hampered by technicalities. This Division will also inform Movements Division of the possible tonnage lift for each month, and keep them advised if there are any changes, and see that these demands are met by the various governmental agencies of the respective countries. This Division is principally a supervising agent of canal operations through proper channels; the governmental agencies of the respective countries doing the actual operations."[2]

c. The Inland Waterways Division headquarters was located at Paris (VS 0544) with the other operating and administrative Divisions of the Office of the Chief of Transportation. Shortly after activation, new Allied military successes necessitated the establishment of an office at Brussels (VJ 6355) and that office in turn established Port Control Offices in Ghent (VJ 1981) and Antwerp (VJ 6795). The latter two then established control points in Turnhout (WE 0506) and Brussels and also as far to the south as Liege (VK 4727) and Charleroi (VJ 6706). Later the Inland Waterways Division expanded its staff until there were representatives in Le Havre (VL 4027) and Rouen (VM 2817), in addition to those indicated above, and at many inland ports. On 4 April 1945, a new Branch was activated, the Rhine Branch, the headquarters of which were established in Biebrich, (WM 3858) Germany.[3]

105. Reconstruction of Inland Waterways.

a. In compliance with instructions from Headquarters, European Theater of Operations, the responsibility for repair and maintenance of inland waterways was assigned to the Chief Engineer of the Communications Zone.[3] Insofar as was practical, this work was to be done by the civilian agencies normally charged with these duties. The rapid advances of the Allied troops prevented the Germans from carrying out thorough-going demolitions on the locks, canals and bridges of Belgium and central France. Destruction was more serious at the Rhine River and on its related canals. After the initial needs had been met, it was found that contracts could be made with civilian firms on a land-lease basis to continue reconstruction with military aid in securing materials. The first job of the 1057 Engineer Port Construction and Repair Group was to reconstruct locks and remove and rebuild damaged bridges on the Oise River, which they completed for limited operations on 28 October 1944. They then moved to the Seine River and assisted the French in opening that river. Construction work on the Albert Canal was carried on by the 1056 Engineer Port Construction and Repair Group, and elements from this organization assisted the British Royal Engineers in removing the difficult Yserbrug (VJ 6795) obstacle at the entrance to the Albert Canal in Antwerp, thus permitting its opening a month earlier than had been set as the target date. This canal was open for limited operations on 24 December 1944 from Antwerp to Liege, for barges of up to 600 ton capacity. The repair of the Quadmechelen locks completed on 25 April 1945, permitted the traffic of barges up to 2000 ton capacity on the Albert Canal to important United States Army inland depots.

SECTION 2

OPERATIONS

106. Early Operations.

a. The first major assignment of the Inland Waterways Division was the transporting of coal to Paris (VS 0544). Later it supervised the movement of barges loaded with military supplies as far inland as Reims (VT 3979) and Soissons (VS 8997). The Division planned to use the inland waterways on the Continent to the greatest possible extent, in order to help relieve the burden on the rail and motor transport facilities. Cargoes of low priority, for depot build-up, were hauled. It was anticipated that the canals would provide a means of increasing the movement of bulk and packaged petroleum products, coal, and Class I, II, and IV supplies. The Inland Waterways Division also acted as a higher echelon for Inland Waterways Offices of the Sections of Communications Zone, and formulated policies fortheir operation. Requests for barges were forwarded from lower echelons to the Inland Waterways Division in Paris and the latter obtained the necessary barges from the governmental control agency of the country involved. In addition to procuring construction materials and barges, it was also necessary to obtain fuel for barges and clothes for the crew members and their families which lived with them on these house-boat-freight craft. Tractors used to tow barges needed parts and tires, and items for barge repair were also supplied. Some complete operational units, such as 65-foot tugs (type CT), were supplied. In Belgium, as well as in France, 38-foot Chrysler Marine Tractors (commonly known as "sea-mules") and Motor Tow Launches were obtained and used in towing, reclaiming disabled barges, and for inland port work.

b. Targets for the daily tonnage of military cargo were set in November, 1944, as shown in Table IV:

TABLE IV

TARGETS FOR DAILY INLAND WATERWAY CAPACITY

	Tons
Rouen (VM 2817) to Paris (VS 0544)	2,000
Rouen to Reims	1,000
Coal Mines to Paris	500
Coal Mines to Reims	250
Marseilles (BT 4615) to Lyons (WX 9578)	800
Antwerp (VJ 6795) to Liege (VK 4727)	6,000
Antwerp to Brussels (VJ 6355) via Charleroi (VJ 6706) and Namur (VJ 9611)	3,000
Ghent (VJ 1981) to Brussels	1,000
Ghent to Lille (VH 6836)	1,500

107. Operations During 1945 up to VE-Day.

a. At the beginning of 1945, all waterways in Belgium and France believed to have military value, had been repaired to permit limited operations, with the exception of the Rhone River. The project for the use of the Rhone River had to be dropped because of the lack of suitable tugs to operate in its shallow water and swift current.

b. In the first quarter of 1945, the main task of the Inland Waterways Division changed from that of co-ordinating reconstruc-

tion to the supervision of operations. As the traffic on inland waterways increased, it became necessary to make better provisions for unloading at inland terminals and depots, as barges were backloaded at destinations and the Services did not have adequate facilities or equipment for handling the supplies as they arrived. Military port facilities were established at Paris (VS 0544), Reims (VT 3499), Lille (VH 6836) Brussels (VJ 6355), La Louviere (VJ 4715) and Liege (VK 4727). These ports were supervised by personnel from the Transportation Offices of the Sections of the Communications Zone, and manned by United States Port Companies, British Port Companies, civilian labor, or by Prisoners-of-War.

c. Early in 1945, a new movement program was set up for barges. This program could not be met for the following reasons:

(1) The German break-through in the Ardennes in December 1944, necessitated the stopping of all barge traffic between Antwerp (VJ 6795) and Liege on the Albert Canal, which at that time carried the bulk of barge traffic in Belgium.

(2) The inland waterways in France and Belgium froze, Bulldozer blades were mounted on sea-mules which began operating as ice-breakers in the Albert Canal, permitting the movement of a limited amount of tonnage. In the canals of the coal region of Belgium, it was necessary to use dynamite as well. In France, the ice-breakers were successful in basins around Paris, but in the Department of Nord they were not, due to the thickness of the ice.

(3) With the melting of the ice, floods became the next hazard. These stopped traffic on the majority of the waterways in both France and Belgium. During these floods, the Seine River reached a height of 6.9 meters at a point where normal water was 1.5 meters. The Oise River reached a height of six meters against a normal of 2.5 meters. These were the highest recorded in 30 years. Because of these conditions, traffic on inland waterways of France and Belgium was of a limited nature from 1 January to 24 January 1945, and stopped completely from 24 January until 25 February 1945. After the high water receded and waterways became operational, an influx of civilian imports began to arrive at the Seine River ports. This led to a shortage of barges for military cargo, as French civilian imports had been given first priority. This necessitated prevailing upon the French to transfer to the Seine River all self-propelled barges of the 38.5 meter class.

d. Tonnage forecasts and targets for total movements on inland waterways were never reached because of the inability of the French and Belgians to force the barge operators to move with the maximum of efficiency. For example, it was recommended by United States and British authorities that lights be installed at obstacles and locks, in order that tugs could work 24 hours a day shuttling barges on the waterways. The French would not agree to this. They offered many reasons; however, they never offered a strong enough argument against it to satisfy the Americans and British. Nevertheless, tugs did not operate 24 hours per day. Also barges never made maximum use of the daylight hours for operation.

c. On 15 April 1945, the Rhine Branch of Inland Waterways Division was activated by the Office of the Chief of Transportation. It had been previously contemplated that the first waterways to be opened in Germany would be the Rhine River system, as this system would be greatly needed to transport supplies from the Ruhr area to Holland as well as within Germany. The purpose of this new branch was to make reconnaissances and to start the work of raising and salvaging damaged equipment. While it was not anticipated that there would be military traffic on the inland waterways of Germany, it was considered that they would be a big factor in the movement of coal, wheat, and numerous other civilian supplies.[4] Reconnaissance was continued up to VE-Day, but the Rhine Branch did not become operational until after the end of the campaign. The Rhine Branch also served as a co-ordinating agency between Advance Section, Continental Advance Section, 12 Army Group, 21 Army Group (British), and the First French Army.

108. Outstanding Operating Problems. Some problems encountered in operations are summarized below:

a. The individual barge operator was a key factor in the whole scheme of the inland waterways system. It was only after he had learned that his national agency again had the power to furnish him with the necessary priorities to secure barge repair and maintenance material, as well as to lend him money for business transactions and to offer him a reasonable amount of assurance that it would be profitable for him to make a fast turn-around, that it was possible for the Inland Waterways Division to approach normal operation. The human element played an important part in the use of the barge as a carrier of supplies. The barge operator desired leisurely movement. After several financially successful runs, he often allowed his turn-around time to increase. To aid in remedying this situation, Inland Waterways Division established on 21 February 1945 a canal patrol on all Belgian canals. The duties of the members of these patrols was to board every barge tied up at places other than depots and loading points. They urged the barge operator to accept the bonus money which their government offered them to enter areas subject to enemy action. Although this was sometimes accompanied by threats of requisitioning, such force was never used. This patrol was a factor in the increase from 74,000 tons in February to 161,000 tons in March, 1945, of United States military supplies moved by inland waterways.

b. Communications between ports and key points in the inland waterways network were inadequate. With better communications congestion due to delayed unloadings would have been reduced.[5,6]

c. Developments in the tactical situation made it necessary to call upon depots supplied by barge to receive cargo far in excess of their normal capacities. While some of the depots met this demand, others experienced difficulty due to the fact that they were located on minor canals where barge maneuvering was limited. Whenever congestion seemed imminent, it was found that the use of a Motor Transport Launch expedited the barge movement. On the other hand, even when a depot did have good quay and storage facilities, congestion invariably occurred if insufficient unloading personnel was not available. To aid in meeting these obstacles, Inland Waterways Division recommended the issue of equipment to depots above Table of Organization allotments, such as belt conveyors, rollers, and crawler cranes.[5,6]

d. Difficulties were experienced in obtaining the personnel necessary for the supervision of inland waterways. The shortage in

staff personnel continued throughout operation up to VE-Day and until after the acquisition of the German canal system.

SECTION 3

CONCLUSIONS AND RECOMMENDATIONS

109. Conclusions.

a. Before the beginning of operations on the Continent, no specific plans were prepared for the operations of inland waterways.

b. There was a lack of military personnel teamed for inland waterway operation, especially for canal operations and the control of traffic in waterways with locks.

c. Necessity for almost complete reliance upon civilian personnel for the operation of inland waterways introduced a major liaison problem, because of the traits and peculiarities of the individuals operating the barges. There was a pronounced shortage of military personnel capable of performing such liaison missions.

d. There was delay in making Engineer assistance available for the rehabilitation of the inland waterways, due principally to their use in operations of higher priority at the time.

e. There was a lack of adequate communications, due principally to the necessity of relying on civilian telephone facilities, except in the important military headquarters.

f. Barge equipment provided for the use of the Transportation Corps for marine operations was not suitable for canal operations.

110. Recommendations. It is recommended that:

a. When inland waterways capable of augmenting other forms of transportation exist, an Inland Waterway Service be organized early in operations.

b. An authorized Table of Organization and Equipment be provided for an Inland Waterways Service, to include reconnaissance personnel and liaison officers when so directed by the Theater Commander.

c. Tactical doctrine for the employment of Engineer Port Construction and Repair Groups incorporate close support of the Inland Waterways Service for the early rehabilitation of inland waterways, with special emphasis on the repair and reconstruction of lock gates and expedients therefor.

d. The Transportation Corps Board, when established, prepare designs for and develop suitable inland waterway craft, preferably self-propelled, for use in narrow and relatively shallow water courses. Particular attention should be directed to the steering gear, rudder, and type of propulsion used.

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CHAPTER 6

SUPPLY MOVEMENT AND CONTROL

SECTION 1

CONSIDERATIONS AFFECTING SUPPLY MOVEMENT

111. Phases in Development in Supply Movement. There were three definite and related phases in supply movement. The first phase was incident to the mounting of the invasion operation and the build-up subsequent to securing the beach-head. The second phase began with movement of the base of supplies from the Cotentin Peninsula and Normandy to the areas of Soissons (VS 8997), Paris (VS 0544), and Verdun (VU 2766), and was high-lighted by the capture, development, and exploitation of the Belgian ports of Antwerp (VJ 6795) and Ghent (VJ 1981) and ended about 1 December 1944. This phase was characterized by difficulties in connection with the inadequacy of ports, which led to the over-extension of the lines of communication. The third phase concerned the support of the Armies subsequent to the defeat of the German counter-attack of December, 1944-January, 1945, and continued to the surrender of Germany. This phase was characterized by shortened lines of communication, adequate railway networks and motor transportation, and greatly improved movement control both within the Communications Zone and the Armies.

112. Phase I: Build-Up Following "Neptune." Planning efforts, during the six months prior to the invasion, were devoted to creating the program for moving a total of 2,900,000 troops and 4,200,000 long tons of cargo to France and Belgium. The success of this operation was due to adequate internal transportation facilities under close centralized control, and to the fact that the plan was not affected to a great degree by enemy action. There were no language difficulties, no problems in documentation since British forms were used, and experience accumulated during two years of operations had smoothed out most difficulties. Depot locations were fixed, and train paths were known. Complete co-operation with British transportation agencies had long since been established. The only variables were the availability of shipping, and the vagaries of Channel weather. But here again, the distance element was fixed and known, and routes were established by the existence of, and the limitation of movement to, swept channels. Delays in the discharge of cargoes on the Continent occasionally caused some accumulation, but control of movement from the depots prevented serious congestion. In short, conditions were relatively favorable for the delivery of supplies.

113. Phase II: Supply Movements on the Continent, July to 31 December 1944.

a. No more unfavorable conditions ever faced the supply agencies of a modern army than those existing subsequent to the landing operations in Normandy. On the credit side, naval and air superiority, together with adequate shipping, assured almost complete freedom of operation between the base of supplies in the United Kingdom and the beach-head. On the debit side, were inadequate port facilities, an inadequate road-net within the lodgement area, and the stubborn resistance of the enemy. After the rapidity of advance far outstripped rail reconstruction, motor transport was required on a large scale. By the time that railway facilities were available to Paris, the Armies were far beyond that city, and again motor transport moved the cargoes.

b. Depots, or rather dumps, were concentrated in the Beach areas and south of Cherbourg (VQ 1522), extending to just north of St. Lo (VT 4963). Expedited discharge from ships in open anchorages permitted only limited classification and recording of stock. In common with most of the Supply Services, there was a lack of personnel experienced in identification. Expenditure of many critical items of supply created serious shortages.[1]

114. Allocation of Tonnage. During this period, the method of establishing supply requirements was the daily telegram. Based on the daily telegrams, a daily conference made allocations of supplies to the Armies, predicated on the availability of transportation. The time lag between allocations and movement was planned to be 30 hours, that is, movement was to start 30 hours after tonnage had been allocated. The basis of allocation was the requisitions submitted by the various Supply Services of the Armies, through their Assistant Chiefs of Staff, G-4, who converted them into bids for tonnage, classified as to Service. The bids were passed through the Regulating Stations established by the Advance Section, Communications Zone, for execution. Where depot stocks in the Advance Section permitted, the requisitions were filled, and the unfilled portions were extracted to the Supply Services, Communications Zone.[1]

115. Regulating Stations. Regulating Stations for each Army were established by Advance Section, Communications Zone, soon after the activation of the 12 Army Group. They did not function as contemplated by FM 100-10, but rather as high-level supply liaison officers between Advance Section and Army. Under the directives of Headquarters, Advance Section, the functions of the Regulating Officer were expanded to include the co-ordination of the construction of supply facilities, such as pipelines, railroads, and roads. In Southern France, Regulating Stations were not established as Continental Advance Section performed all of the functions envisaged by FM 100-10. In December, 1944, when attention was directed at the non-compliance with FM 100-10, the Transportation Officer, Continental Advance Section, was named Regulating Officer. With representatives of the Military Railway Service and the Services of Supply of Continental Advance Section he performed the functions of a Regulating Station for the regulation of traffic. Each of the Service heads was designated as Regulating Officer for his Service for the processing of Army requisitions.[2,3]

116. Phase III: The Realization of a Supply Movement Program.

a. By 1 December 1944, Antwerp (VJ 6795) was in operation, rail rehabilitation had reached a satisfactory status, and the Motor Transport Service had been reinforced with the arrival of new truck units. Operating experience had familiarized Movement Control personnel with their duties, and documentation had improved immeasurably.[1] The daily telegram had been replaced with a forecast of requirements for 10-day periods.[4] Depot capacities had increased, although the situation in the Liege (VK 4727) area was still critical. Charleroi (VJ 6706) maintenance area was only in the planning stage,[1] although authority had been granted to provide installations in that area. Of still greater importance was the commitment of Communications Zone intermediate and advance depots to receive unclassified tonnages direct from Antwerp, with the portion not required for Army use to be returned to rear area dumps.[1,4] This plan made possible the realization of the full discharging capacity at Antwerp, then fixed at 20,000 tons daily for United States use, and eliminated the build-up on the quays.

b. Prior to establishment of the new supply movement program, the Assistant Chief of Staff, G-4, Communications Zone, exercised movement control of the broadest scope, beginning with the allocation of

shipping to ports and including the movement of supplies by overland transportation and air, all of which would normally be under the jurisdiction of the Chief of Transportation. During October, 1944, as a special staff function, the Chief of Transportation prepared forecasts of availability of transportation for use in the planning of supply movements. Requirements were not firm, nor could they be forecast with any degree of accuracy. Finally, the Assistant Chief of Staff, G-4, Communications Zone, agreed to turn over the implementation of the plan for supply movement to the Chief of Transportation.[4] The situation had clarified; now that the operational services of the Transportation Corps had planned objectives, and providing the facilities were available, there was every reason to expect performance. The new program provided that requirements were to be established by the 15th day of each month, based on projected requirements, namely, forecasts of shipping arrival, troop movements in and out of the European Theater of Operations, and an estimate of the requirements of the Armies and Base Sections for the following month. The program would become effective on the 15th day of the succeeding month. Changes could be made only by authority of the Assistant Chief of Staff, G-4, Communications Zone.[4] This was the framework of the Supply Movement Plan as it existed about the time the German Army started its Ardennes counter-offensive in December, 1944.

c. The immediate effect of the German counter-attack, from the point of view of supply, was to cause a tremendous accumulation of rail cars in the Liege (VK 4727)-Charleroi (VJ 6706) area. Embargoes were placed upon all movements to those areas. Truck transportation and rail facilities were used to move reinforcements into the threatened area, and barges were held under load for evacuation, or use as mobile depots. Back-logs grew at the ports, and the capabilities of transportation were taxed to the utmost. After the emergency situation passed, those back-logs were cleared, and the supply movement program functioned smoothly until the end of the campaign. Later experience showed that planning of supply movements for one month in advance was practical and desirable, and that modifications of a detailed sort should not be permitted for less than a 10-day period.

SECTION 3

MOVEMENT CONTROL

117. Phases in Control of Freight Movements. From the standpoint of freight movements on the Continent, the period of active military operations falls into two distinct phases. The first phase, one of almost no centralized control, covers the period from August, 1944, to January, 1945. The second phase, one of a partial and increasingly centralized control, covers the period from January, 1945, to 8 May 1945.[5]

118. Decentralization of Control over Freight Movement.

a. During the first phase, the commanders of the various Sections of the Communications Zone were given almost complete responsibility over the control of movements originating in their areas. The "technical supervision" of the Chief of Transportation was construed in the very narrowest sense. The lack of rapid and complete communications, resulting from the extension of the Communications Zone over a vast area in a short period of time, made such decentralization necessary at the beginning. The effect, however, was that all instructions as to freight movements had to be processed through command channels, a time consuming and cumbersome procedure. Transportation

Corps personnel in the Section commands refused to move traffic without a G-4 order. Under this procedure, the G-4 Section of the Communications Zone became an operating agency, issuing detailed instructions to the Section Commanders. The Freight Branch, Movements Division, Office of the Chief of Transportation, acted primarily in an advisory capacity. One result of this decentralization was that depots were usually selected without consulting transportation representatives, and frequently without regard for transportation limitations. In consequence, freight was almost always programmed to an installation at a rate greater than its capacity. Rail or truck congestion inevitably followed.

b. Many of the factors affecting movement control were unknown or variable. Movements were based on priorities, day-to-day requirements, and estimated capacities. It was possible to know in detail what was to be imported, but the exact capabilities of ports, rail lines, and depots were not known and were subject to constant change. Time had not permitted the establishment of large reserves in the Army areas and in Communications Zone depots, and, as a result, supply was on a hand-to-mouth basis, governed by a set of daily allocations and a system of priorities which often exceeded the receiving capacity of the destination.[4,5] By November, 1944, it had become clear that the capacity of the transportation system to move tonnage exceeded the combined receiving capacity of the depots. The essence of movement control is to limit movements to the capacity of the bottle-necks of the system and to press constantly for the elimination of such bottle-necks. Owing to the priority system and control of movement by the Assistant Chief of Staff, G-4, Communications Zone, the Office of the Chief of Transportation could not effectively restrict and police freight traffic in accordance with depot capacities. Moreover, the Assistant Chiefs of Staff, G-4, of the Sections of the Communications Zone were free to use movement capacity remaining after priority allocations made by the Assistant Chief of Staff, G-4, Communications Zone, had been met. This frequently resulted in additional freight arriving at depots already overburdened with more traffic than they could handle.

119. Reporting of Freight Movements. During the early phase of decentralization, before the monthly movements program was instituted, a system of reporting the daily movement of freight had been established. Every night, the Transportation Officers of ports and the Sections of the Communications Zone telephoned reports to the Operational Records Branch of the Movements Division, giving in detail the status of freight cars in each port and depot. These reports summarized the numbers of cars received, unloaded, and dispatched. The daily telephonic reports were subject to later corrections, based upon information furnished by depot commanders. Defects in co-ordination and reporting were revealed, as there were frequent differences in the data furnished by the Transportation Officer of an installation and its commander. For this reason, local Transportation Offices were instructed to co-ordinate their reports with those of the depot commanders.[5]

120. Inauguration of the Supply Movements Program. During the first phase, despite the extreme decentralization, there was a gradual building up in the Transportation Corps of the means, if not the authority, for centralized control. On 1 January 1945, with the publication of the first Monthly Personnel and Supply Movements Program, the phase of extreme decentralization of movement control came to an end. The Monthly Movements Program attempted to adjust Service demands for supply movement with the capabilities of the transportation system and the depots. Although it was issued as a command directive, it was generally recognized that it could not be carried out in detail. It was considered that the program would be used mainly as a general guide for the supervision of freight movements.

121. Shipping Allocation Meetings. In February, 1945, a system

of shipping allocation meetings was established for the purpose of pre-allocating the tonnage arriving in each convoy to the final depot destination, and routing ships to ports to obtain the most economical movement to that destination. These shipping allocation meetings were presided over by the Assistant Chief of Transportation for Control and Planning. Representatives of the various supply services concerned, and an officer from both the Regulating and Processing Sections of the Freight Branch, attended. The officer from the Regulating Section checked on allocation of tonnage to various depots from the standpoint of the traffic conditions at those depots, and the officer from the Processing Section checked on the allocations from the standpoint of the back-log for each depot existing in the ports at which ships were to be placed. This system provided a means of adjusting the movements program to the arrival of ships.

122. Congestion in Supply Depots. Depots were often congested because of the failure to unload programmed tonnages, or the arrival of unprogrammed shipments. In the former case, a daily check was maintained by the Freight Branch on the car situation in depots, and teletype messages were dispatched through command channels pointing out that an excessive number of cars was on hand and requesting acceleration of unloading. The same procedure was followed when an Army had an excessive number of cars on hand. In the latter case, an attempt was made to find a method of satisfying the demands which had not been in the program.

123. Non-Programmed Shipments. The Monthly Movements Program proved to be an inadequate instrument in controlling inter-depot movements, as these varied from day to day in accordance with shifting supply availability and requisitions. Therefore, in March, 1945, request was made to the Assistant Chief of Staff, G-4, by Movements Division, to publish a directive requiring that all inter-depot movement be cleared through Freight Branch, Office of the Chief of Transportation. The curtailment of such movements became increasingly necessary as freight cars were shifted into Germany, thereby creating a temporary shortage at ports and in rear areas. Since depots were one of the principal creators of empty freight cars, the effect of uncontrolled inter-depot movements was to give depots first priority in obtaining cars. Finally, a compromise solution was worked out whereby it was agreed to curtail the inter-depot movements program and require all non-programmed movements (whether initial movement, reconsignment, or diversion) to be cleared through Freight Branch, Office of the Chief of Transportation, which would co-ordinate such movements with G-4 Section, Communications Zone.[6,7] Freight Branch, taking the position that the movements program represented the maximum commitment of the transportation system, insisted that each of the Supply Services eliminate an equivalent tonnage from its program before the non-programmed movement would be authorized. The chief obstacle remaining in enforcing compliance with the program was the difficulty of insuring that local Transportation Office personnel were familiar with details of the program and the procedure, and would insist on compliance by all concerned. The constant turnover and shifting in the personnel of local Transportation Offices complicated this matter. The only solution was constant policing of movements by the Freight Branch and sending command teleprints to the Commanding Generals of Sections of the Communications Zone pointing out deficiencies.

124. Embargoes of Shipments into Depots.

a. When the congestion in a depot became serious, it was necessary to halt all shipments into the depot by means of an embargo. When the control of the movements program was placed in the hands of

the Chief of Transportation, the power to embargo depots remained in the hands of the Assistant Chief of Staff, G-4, Communications Zone. Therefore, the control of the former was to a certain extent nullified by delays in processing requests for embargoes through general staff channels, when depots became overcrowded with rail cars, barges, or trucks. A compromise solution was finally achieved in March, 1945, by establishing a procedure as follows:

(1) When it appeared necessary to the Office, Chief of Transportation, or to a Transportation Officer of a Section of the Communications Zone to embargo a depot, the latter was requested to have the Commanding General of the Section of the Communications Zone, forward a teleprint to the Commanding General, Communications Zone, requesting that an embargo be placed on the depot.

(2) Information copy of the teleprint was sent to the Office, Chief of Transportation, Communications Zone, which took immediate action without waiting for confirmation by the Assistant Chief of Staff, G-4, Communications Zone.

b. The policy of the Communications Zone permitted the armies to requisition as they saw fit within their credit limitations. With the advance of the Armies into Germany, reports as to loaded freight cars received and on hand in the Army areas became less and less accurate.[1,7] As an index to the car situation in the Army areas, increasing reliance had to be placed upon Military Railway Service reports showing cars held back on the lines owing to congestion. Throughout the month of March, 1945, the cars on hand in the Army areas and held back owing to congestion showed an increase, resulting from the tendency of the Armies to order more than could be moved forward through transportation bottle-necks into forward areas. In order to prevent a continuance of the upward trend of freight cars under load, a five-day embargo on movements to all the Armies in excess of a total of 10,000 tons was placed into effect, followed thereafter by a six-day embargo. The effect of these embargoes was negligible, due to the difficulty of disseminating information to the Regulating Stations in time for them to take effective action. The situation was finally eased only by the end of the campaign in Germany and the constant pressure from the Office, Chief of Transportation, to obtain unloading of freight cars and return of empties. With the opening of the Rhine River bridges, the return of empty freight cars was delayed owing to the time lag in extending the forward movements of loaded freight cars to the railheads at which they were emptied and turned around.

125. Freight Documentation.

a. Documentation of rail traffic in the United Kingdom was based upon British military practice. Prior to the arrival of the United States Forces, the British railways were experienced in the handling of all types of military traffic, and British Movement Control had instituted the use of certain documents to cover such moves. United States traffic moved under similar arrangements with the exception that car labels of a distinctive type were added, in order that United States traffic might be quickly identified.

b. The planning of freight documentation on the Continent was of a general nature. Following the lead of the British Forces, some consideration had been given to the question of freight warrants, and it was planned to use our own form of documentation. Although the British experience in 1939 and 1940 had proved the value of bi-lingual

or tri-lingual documentation forms, we came to the Continent unprepared on this point. In Phase I and II this deficiency had but little effect, but when Phase III (all French) operations were inaugurated, it became a glaring weakness and although immediate steps were taken to remedy it, printing difficulties prolonged this situation. Documentation of a type which can be read and understood by civilian railway workers is a primary necessity, and its use in the early phases of operations would have been of inestimable value. Although contacts were made late in September, 1944, with the French railways with the idea of instituting a uniform system of rail documentation, the negotiations were prolonged and it was not until 1 January 1945 that instructions finally reached the field Rail Transportation Officers as to the documentation called for by our agreement with the Societe Nationale des Chemins de Fer. The result was that we were unable to verify our figures for tonnage moved prior to 1 January 1945, whereas the British, profiting by their experience earlier in the war, were able to maintain accurate records of all tonnage moved over civilian carriers.[5,6]

126. Highway Traffic Regulation.

a. Under authority of FM 101-15, the Transportation Officer (G-4) is responsible for traffic control. Standing Operating Procedure 50, "Road Traffic Regulation and Control on the Continent," was issued by Headquarters, European Theater of Operations, on 7 October 1944, for guidance in highway traffic. This directive gave technical supervision of traffic control to the Chief of Transportation, with similar authority granted to the lower echelons of command, each to exercise supervision over traffic within the area of their respective commands. It provided for implementation and policing by the Military Police, with logistical control being vested in the Transportation Officer.[5] The issue, late in 1944, of Standing Operating Procedure 65, "Motor Vehicles," by Headquarters, European Theater of Operations, established a Road Traffic Headquarters in the Office, Chief of Transportation, Communications Zone, for the regulation of United States Army motor convoy movements, with subordinate Road Traffic Headquarters in each of the Base Sections and their subordinate Districts for local supervision within their areas.

b. Both centralized and decentralized systems of traffic regulation were tried - the former during the period from September to November, 1944, when poor communications made this control difficult. During the period when the various Base Sections were obtaining personnel and organizing their respective traffic headquarters, all control was exercised by the Road Traffic Headquarters, Movements Division, Office, Chief of Transportation. It was learned from experience, however, that the centralized control of highway traffic was not desirable, except for the operation of intersectional convoys engaged in scheduled cargo movement.

c. In order to provide skilled traffic directors, civilian traffic engineers were brought to the Continent and assigned to all echelons of Road Traffic Headquarters. Like many of the civilian aids, they were able to contribute much in the way of knowledge; but their civilian status often brought about further problems that would not have occurred had they been officers.[5]

127. The Rail Transportation Officer in the Field.

a. A Sectional or Regional Transportation Office represented the Chief of Transportation for all transportation activity which occurred within its territory. This area was usually too large for one office to maintain control over all traffic details, and for

this reason, the section or region was further broken down into districts. The Transportation Office in the District was the Transportation Corps work center; the Sectional Office was mainly the supervisory office for the territory. The actual operator in transportation control was a Rail Transportation Officer. He was the man on the spot who took care of all the traffic details of freight and passenger moves. Considering the fact that Rail Transportation Office personnel were constantly being shifted during operations on the Continent, and that personnel not trained in traffic work were frequently placed on this duty, the performance of Transportation Corps field Traffic Regulating personnel was excellent. A serious difficulty frequently arose from the fact that Transportation Corps Traffic Regulating personnel were frequently assigned to non-traffic duties, such as security or traffic police and truck drivers.[5] The most valuable characteristic of traffic regulating personnel is high intelligence, rather than rail or truck experience. A sprinkling of experienced yard and motor freight operators was valuable; but good common sense, a high sense of obligation, and willingness to work was more important.

b. One of the most serious problems was furnishing the Rail Transportation Officer with adequate and current instructions as to his duties and functions. Moreover, it was found that the Rail Transportation Officer must have a clearly defined area of responsibility. He must be a part of a clearly defined district control, with definite instructions as to who is his superior on a district level. The district should correspond to the local railway district, and the district Transportation Officer alone should be authorized to deal with railway officials on a district (in France, arrondissement) level. This is especially true when the district is operated by a civilian and not a military railway organization.

c. In areas of civilian railway operation, it became necessary for Rail Transportation Officers to take on certain functions which are normally railway operations. In Continental Advance Section, for example, Rail Transportation Office personnel supervised the large classification yard at Is-sur-Tille (VO 0984) which made up trains for Seventh Army, after the Transportation Officer became responsible for railway traffic regulation.[8] In Oise Base Section, Rail Transportation Office personnel supervised Regulating Stations at Chalons-sur-Marne (VT 5445), Lumes (VO 8830), and Metz (VU 8657), which intercepted all traffic for certain depot areas which had limited switching facilities; block trains were made up for each railhead in these areas and then released in accordance with depot conditions.[1]

d. The plan for the Continent was to assign a complete Traffic Regulating Group to each Section of the Communications Zone. This was satisfactory up to the time when the activity within the various Sections expanded to such a point that each needed additional Rail Transportation Office personnel. Since Rail Transportation Office personnel was relatively scarce and since the additional demands of each Section did not usually require the assigning of another complete Traffic Regulating Group, detachments of Groups were sent out as needed. Consequently, at a final inventory when all Rail Transportation Office personnel had been assigned, within one Section there might be one Traffic Regulating Group and detachments of three or four others. Record-keeping and the administrative functions of the various detachments became complex.

SECTION 3

CONCLUSIONS AND RECOMMENDATIONS

128. Conclusions.

a. Until a central controlling agency could prepare plans based on projected forecasts and could establish definite targets for the operational services, the efficient co-ordination of transportation was not possible.

b. The following were found to be essential for the integration and co-ordination of supply movement:

(1) Accurate forecasts of requirements, on as long range basis as possible, for Armies and Communications Zone installations.

(2) Accurate and timely forecasts of arrival of ships when overseas supply is required.

(3) Accurate estimates of troop strength and their flow.

(4) Accurate information as to capacities of the various operational services.

(5) An adequate communications system.

(6) Adequate documentation, with consideration given to multi-lingual requirements.

(7) An adequate field organization for the control of the movement of traffic.

(8) Centralized control under the Chief of Transportation, including the power to impose embargoes to prevent the accumulation of supplies at overcrowded depots.

c. The daily telegram system of requisitioning was not satisfactory, as a basis for planning supply movement programs.

d. Documentation troubles arose concerning the movement of supplies, especially in the identification of destination, routing, and cargo--a product of non-standardization of forms.

e. The use of simple forms, with adequate instructions forming a part thereof, should be the basis of all movement. The form should provide information relating to the origin of the shipment, its identification of record (requisition number), and a sufficient description to enable identification. Routing and destination are equally important, and the form should leave no doubt as to the latter. Documentation pertinent to actual movement should always be distributed to the dispatching agency, the carrier, and the receiver. Exact identification of the carrier should be incorporated in all forms of waybills, with emphasis on the vehicle number, whether it be a ship, freight car, truck, or airplane.

f. The concept of the Traffic Regulating Group was generally sound with reference to its mission. The principal difficulties which developed were inadequate communications facilities among the

different posts in the field, and insufficient organic transportation facilities.

g. The Traffic Regulating Group was adequate for operations in the United Kingdom, but the wide dispersion incident to manning traffic regulating installations on the Continent, caused considerable administrative difficulty. A smaller unit, comparable in size to the traffic regulating battalion generally used by the Armies, with each battalion providing its own administrative functions, was better suited to the needs. The means for such organization exist within the cellular Tables of Organization and Equipment 55-500 series. It would have been more desirable to have provided three such units to each Base Section, than one large unit, which was frequently scattered over several thousand square miles of territory.

129. Recommendations. It is recommended that:

a. Movement Control personnel of the Communications Zone (Section, District, and Port Transportation Officers) should be directly responsible to the Chief of Transportation.

b. The Chief of Transportation should have special functions, together with certain general staff functions, to establish movement policies, issue movement instructions, and exercise complete control over military freight traffic. This should include the power to embargo. A movements channel should be established in addition to command and technical channels.

c. Movement programs should be as long range and all inclusive as possible, and should be based on experience factors wherever possible. An over-all program should be published once a month, and detailed amendments, where necessary, three times a month, but not to exceed 10 per cent for any Service, based on planned shipments. This detailed program should be given complete distribution to all Rail or Road Transportation Officers and shippers.

d. Organic signal communications equipment should be provided for all traffic regulating units, on a basis of one field telephone set, with enough wire for inter-connection with appropriate administrative nets, per four cellular units, and not less than three, two-way, variable frequency, radio sets, with a voice range of 50 to 75 miles, for each unit of battalion size. Provision for teletype service between Movement Control Headquarters and those of the major Transportation Offices in field installations should be provided.

e. Authority for the supervision and policing of documentation should be delegated to the Chief of Transportation. This authority should include responsibility for the preparation of the forms of documentation and the instructions governing their use.

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CHAPTER 7

TRANSPORTATION CORPS WITH THE FIELD FORCES

SECTION 1

ORGANIZATION

130. Planning Period, First United States Army. With the assignment of the First United States Army to the assault of the Continent as contemplated in operation Neptune, planning was initiated for the logistical support to be provided on the far shore by the Army itself. In this planning it was contemplated that First Army was to be reinforced to some extent by troop units of Advance Section, Communications Zone, for logistical support. The functions normally those of the Transportation Corps incident to operations after securing a lodgement area in France were to be performed by the Engineer Special Brigades with Transportation Corps troop units attached, under the control of First Army until its rear boundary had been established, when Advance Section would assume these responsibilities. In the organization of the First Army staff, a small Transportation Section was provided, primarily for the purpose of co-ordinating marine activities, since all supplies would arrive by water. All water-borne supply movements were to be co-ordinated by Movement Control Organization. Truck transportation assigned to First Army was under the operational control of the Army Quartermaster in accordance with existing doctrine, and a Transportation Section under the Quartermaster performed the necessary staff work in its operations. Traffic regulation was to be under the control of the Assistant Chief of Staff, G-4, and performed by Military Police organizations within the Army.

131. Planning Period, Third United States Army.[2]

a. Prior to the arrival of the Third United States Army in the United Kingdom, motor transportation had been under the Army Quartermaster, and the Transportation Section of the G-4 staff functioned only in matters of concern to it as a general staff sub-section. Soon after, all Army transportation activities were placed under the control of the Assistant Chief of Staff, G-4. In accordance with this plan, it was necessary for the Transportation Section to absorb certain duties normally carried out by the special staff. The most important of these was that all Quartermaster transportation units assigned or attached to Third Army were placed directly under G-4.

b. The Transportation Section was divided into four sub-sections: highway, rail, water and miscellaneous. These sub-sections were, in general, designed to carry out the following functions: control of motor, rail, water, pack animal, and impressed transportation; traffic circulation and control in the Army area and the establishment of a traffic headquarters; designation of main supply roads and their marking; establishment of traffic priorities and restrictions; arranging convoy clearances; establishment of priorities for contruction and maintenance of roads and bridges; control of Quartermaster truck companies and Quartermaster troop transport companies; pooling and dispatching of truck units; making recommendations to the Transportation Corps of the Communications Zone, as to use and operation of railroads in the Army area; assisting in carrying out general policies pertaining to the use of rail transport; establishing priorities for rail shipment in the Army area; compilation of data with reference to the facilities of railheads, such as sidings, adjacent road-nets, and available warehouse space; co-ordination of traffic via inland waterways between

Communications Zone and points in the Army area; issuing of instructions as to the use of port facilities and inland waterways by the Army. The Miscellaneous Sub-section had the duty to issue the instructions for the use of pack animals, pipe lines, and impressed transportation facilities.

c. As planning developed, it was realized that the Transportation Section was not of sufficient strength to take care of operational requirements, therefore efforts to increase its strength were commenced. By April, 1944, the number of Quartermaster truck units of Third Army had grown to 42, including nine Quartermaster troop transport companies, four Quartermaster Battalion Headquarters (M) and one car company augmented by one platoon from each of two additional car companies, making a total of six car platoons. By Third Army Staff Memorandum 37, dated 6 May 1944, the authorized strength of the Transportation Section was increased to eight officers and 15 enlisted men. During the month of June, 1944, transportation units were given movement priorities, and commenced preparations for overseas movement.

d. In order to provide personnel for traffic planning and movement control, and to augment the Transportation Section, authority was requested on 29 May 1944 to organize a provisional Traffic Regulating Group of 25 officers and 142 enlisted men, so that personnel might be trained prior to arrival on the Continent. On 2 June 1944, the Theater Commander, under the provisions of War Department Circular 227, as amended by Circular 241 (both 1943 series), issued authority to organize provisionally, the 6811 Traffic Regulating Group consisting of 18 officers and 158 enlisted men, to be organized and equipped in accordance with Tables of Organization and Equipment 55-500, 17 August 1943, as amended. The principal difficulty was obtaining personnel. Authority was granted only to draw personnel from sources available to the Army, to be placed on detached service with this provisional organization.

e. The importance of having trained traffic regulating personnel in the Army Headquarters was recognized during other campaigns and recommendations to that effect had been made to the War Department, and referred to the Chief of Transportation, Army Service Forces, for action. Existing policy was not in accord with this recommendation, and approval was not obtained.

132. Planning Period, Seventh United States Army. Like the Third Army, the Seventh Army Transportation Staff Section controlled motor transportation and was responsible for traffic regulation and movement control. It was established on special staff level. Provisional Traffic Regulating Groups were organized corresponding in strength to the normal group organization of 75 officers and 300 enlisted men in accordance with Table of Organization and Equipment 55-500, with the exception that the total strength was divided into company size units of approximately 25 officers and from 75 to 125 enlisted men. Part of this strength was utilized to augment the Army Transportation Officer's staff.[3]

133. Planning Period, Other Armies and the Army Groups. The Ninth and Fifteenth Armies were provided with small Transportation Staff Sections under the Assistant Chief of Staff, G-4, and performed staff functions only. In both Armies, motor transport was under the control of the Army Quartermaster. Traffic regulation and movement control was provided by Communications Zone Traffic Regulating Groups in rear areas, and by Military Police in Army areas. With the authorization for the activation of Provisional Traffic Regulating Battalions of 25 officers and 133 enlisted men in January, 1945, traffic regulation as contemplated by FM 100-15 was made a function of Army by the

assignment of a Provisional Traffic Regulating Battalion to each Army. Traffic regulation and movement control was assumed by these units in Army areas. Transportation Sections existed in both 6 and 12 Army Groups. The 6 Army Group used the personnel as a sub-section within G-4 Section. The 12 Army Group had a special staff section.

134. General. It should be realized that lack of precedent because of the non-existence of the Transportation Corps prior to the outbreak of hostilities, and the general unfamiliarity with the capabilities of the Transportation Corps as later developed, contributed to hesitancy in applying policies, then just coming into being. The Transportation Corps was considered as a Communications Zone agency and therefore was not generally considered in Army planning. The need for co-ordinating with installation and services of the Communications Zone, however, necessitated certain provisions for a liaison organization, which later became a functioning staff unit. The inclusion of Transportation Corps staffs and troop units within Armies was a result of its development from being exclusively a Communications Zone agency to a Service that was equally adaptable to the Armies.

SECTION 2

OPERATIONS

135. Motor Transportation: Armies. Prior to arrival on the Continent, the Motor Transportation Branch of the Transportation Service of the Third Army had been established on a working basis. In order to provide centralized control for motor transport operations, the Third Army Transportation Officer was given control of all assigned Quartermaster truck companies, other than those organic to units. Where the necessity for augmenting transportation facilities within the Third Army existed, temporary assignments were made for the performance of the immediate mission and upon its completion, the truck companies would be available for return to the Third Army pool. After operations had commenced in France, the same principles were observed and the Third Army was usually in a position to supply the necessary mobility, and logistical support within itself. The size of the Transportation Section of both Third and Seventh Armies did not permit the degree of control that might have been obtained had more personnel been available. In order to compensate for this shortage the Provisional Traffic Regulating Group assumed a degree of operational control not contemplated in its original mission. Maximum use was made in the Third Army of the Group and Battalion Headquarters for both administrative and operational control of motor transport, and they actually functioned as the Motor Transport Division of the Transportation Officer's staff.[2] Table I shows the average daily utilization of motor transportation for line of communications hauling by the Armies of the 12 Army Group.[4]

136. Motor Transportation: Corps and Division.

a. The control of motor transportation in corps and divisions was the responsibility of the Quartermaster, with a member of his staff designated as the Transportation Officer, charged with the staff functions governing its operation. All truck units assigned or attached to corps and divisions came under the control of the Quartermaster, through his representative, the Transportation Officer. The organic transportation of the Quartermaster company of the Infantry division had the dual function of the distribution of bulk Quartermaster supplies and that of supplying, within its ability, such motor transpor-

TABLE ONE

UTILIZATION OF GM TRUCK COMPANIES BY ARMIES OF 12TH ARMY GROUP

ARMY	ITEM	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN 45.	FEB.	MAR.	APR.
FIRST	Total Truck Companies	43	45	46	45	47	51	40	42	50
	Truck Cos. Hauling Cargo	21	24	22	22	26	30	24	25	28
	Tons Per Day Hauled	3440	2460	3830	4400	4530	4000	3620	4815	3405
	Ave. Distance, Miles, Fwd	33.5	42.5	23	22.5	22.5	22.5	22.5	22.5	22.5
	Tons Miles/Company/Day	5520	4270	4000	4500	3915	2990	3400	4345	2745
THIRD	Total Truck Companies	48	45	39	38	39	48	44	46	54
	Truck Cos. Hauling Cargo	27	30	29	26	16	16	20	26	33
	Tons Per Day Hauled	5720	7270	7000	6625	6720	8920	5530	4250	5095
	Ave. Distance, Miles, Fwd	54	43	31	29	26.5	25	28.5	45	61
	Tons Miles/Company/Day	11450	10400	7470	7300	12630	13925	7365	7380	9380
NINTH	Total Truck Companies	-	-	-	39	34	22	34	41	47
	Truck Cos. Hauling Cargo	-	-	-	13	7	6	18	24	28
	Tons Per Day Hauled	-	-	-	1630	2440	2595	4760	8210	4535
	Ave. Distance, Miles, Fwd	-	-	-	29.5	26	26.5	26.5	42	48
	Tons Miles/Company/Day	-	-	-	3690	9075	11450	6730	14375	7775

NOTE. Ton Miles Computed for Forward Distance in Miles only.

tation as was required for the operations of the division, including the transportation of personnel. The distribution of Quartermaster supplies within a division required about 70 per cent of the truck capacity furnished by existing Tables of Equipment, when not employed in the movement of personnel. Any consideration of a change in responsibility for motor transportation within the division should anticipate the retention by the Quartermaster of a sufficient number of motor vehicles to meet the local distribution requirements of that Service. It was usually found to be necessary to augment the division Quartermaster companies with truck companies furnished by the Armies in order to provide not only the necessary mobility because of the fast moving situation that developed subsequent to the break-through at St. Lo (VT 4963), but also to accommodate the extended distance between supply points and consuming areas. It was found from experience that at least one additional truck company was required for each infantry division, and two for each armored division. This experience was general in the 12 Army Group. [5]

b. Within the corps and divisions, as contemplated by FM 101-15, "Traffic Circulation and Control," the functions of traffic regulation and movement control were exercised by the Assistant Chief of Staff, G-4, through a member of his staff, also known as the Transportation Officer. Thus, two of the normal functions of the Transportation Corps of the Communications Zone, namely, operation of motor transportation and traffic regulation-movement control, were exercised by two staff echelons. Since bulk movement of cargo by motor transportation of the Transportation Corps in the Communications Zone, and truck companies are provided for that purpose, it would appear logical to extend that responsibility to all major echelons of the field forces. The necessity for the co-ordination of movement exists to the same degree forward of the Army area, as well as to the rear. In order to provide a completely integrated transportation system, it would further seem desirable to extend representation of the Transportation Corps down through Armies to divisions. The Transportation Officer would assume the transportation functions now exercised by the appropriate staff section of the Assistant Chief of Staff, G-4, and by the Quartermaster, and as such would acquire the operational and planning responsibilities inherent in these functions.

137. Traffic Regulation and Movement Control.

a. A Provisional Traffic Regulating Group had been organized prior to the Third Army becoming operational on the Continent. This Group provided staff branches for rail, highway, motor transport, and later an Air Branch. It was handicapped from the beginning by lack of experienced personnel, and it was unable to develop its full strength in personnel before entering the combat zone. It had been decided that every effort would be made to obtain for the Group personnel having some civilian training in transportation, and this principle was followed closely. This resulted in a smaller than desirable organization, but it possessed a relatively higher experience level than in many similar units. The experience in the Seventh Army was similar. [3]

b. Early and comprehensive reconnaissance by the Transportation Sections of both Third and Seventh Armies developed transportation capabilities that might have escaped less experienced observers. A good example of effective reconnaissance occurred during early September, 1944, when, with the Armies, operating beyond rail facilities as then developed, it was found that rail transportation could be made available by re-opening French railway lines beyond Sommesous (VT 4021) and Ecury-sur-Coole (VT 5238). [2] The local French railway authorities were ready to begin operation as soon as relatively minor repairs were

made. Shortly after, the rail line was open, moving Ordnance Class V to forward supply points of the Third Army.

138. Air Supply and Evacuation. The rapidity with which the Third Army moved across France made necessary the use of air supply. Plans had been made with the Troop Carrier Command and the 9 Engineer Command, the latter being responsible for airstrip development, for the support by air of the fast moving Third Army. On 15 August 1944, requisitions were placed by the Third Army for the delivery of 1,500 tons of supplies. In the period 19-26 August 1944, 2,065 tons were delivered to airstrips in the Third Army area. To accomplish this, it had been necessary to fly 840 sorties, the largest number of which occurred on 26 August 1944, when 449 aeroplanes were used to deliver 1,164 tons of Class I, III, and V to the Third Army. By 29 August 1944, a total of 2,590 tons had been delivered to Third Army administrative fields and 1,021 aeroplanes had been used.[2] While the Transportation Section exercised no control over the operation of the aircraft, it co-ordinated activities between the Air Force and the Army and provided the transportation to clear the airborne cargoes from the airfields to Army and division truck-heads. A similar arrangement existed within the Seventh Army and the transportation staff co-ordinated air transport movements to the same degree.

139. Railway Operations.[2] The importance of rail transportation was appreciated by the Armies and every effort was made to take advantage of its use. The early opening of railroads was desired by the Armies, in order to make savings in gasoline, rubber, and ton miles of trucking. The prompt staffing of rail-heads with Third Army personnel contributed to the exploitation of rail facilities. Because of supply difficulties which had hindered the continued movement of the Third Army, the Transportation Section was sensitive to all forms of transportation that could be used to support further advances, and the maximum use of these facilities was made. In common with most early rail operations, poor documentation was responsible for the somewhat high percentage of car diversions reported in Third Army areas.

SECTION 3

CONCLUSIONS AND RECOMMENDATIONS

140. Conclusions.

a. Transportation staffs are necessary in all echelons of field forces, down to include divisions. Experience showed that the Transportation Officers in the field forces should command all Transportation Corps units assigned or attached and that they should implement the organization outlined in FM 101-15, "Traffic Control."

b. Experience indicates the necessity for the retention of a sufficient number of vehicles in the division Quartermaster company to provide for the local distribution needs of the Quartermaster.

c. It was found to be desirable to assign or attach to each Army one Traffic Regulating Group, its strength depending on the geographical area and communication system within the zone of the Army activity, and the number of lines of communication.

d. The fast moving nature of this campaign required a high degree of utilization of motor transport by combat organizations, and indicated the necessity of increasing the number of truck companies

assigned to divisions, corps, and Armies.

e. The attachment of amphibian truck units to the Armies was of advantage for the early exploitation of stream crossings.

f. Organic radio equipment is desirable in the Quartermaster Truck Battalions and Truck Group Headquarters assigned to the Transportation Corps. Control was improved immeasureably when means of rapid communication were provided.

g. Railway construction units of the Corps of Engineers are needed to be attached to (or in close support of) Armies for early rehabilitation of railway facilities with Military Railway Service units held in support for earliest exploitation.

h. The attachment to each Army of an Aviation Engineer Battalion would appear desirable for the earliest possible development and administration of air strips, to permit the maximum use of air supply and evacuation.

141. Recommendations. It is recommended that:

a. All motor transportation organizations be under the command of the Transportation Officer in all major Ground Force tactical commands, inclusive of the division. These units should not operate motor transport organic to other Services, the use of which are required to perform the primary mission of those Services, except in those instances where the bulk transportation of personnel and general supplies are concerned.

b. Field Service Regulations FM 100-10, "Administration," and other applicable publications, be amended to provide special staff functions for the Transportation Corps in all commands authorized a general and special staff, inclusive of the major tactical commands of Army Ground Forces, down to and including the division.

c. Tables of Organization and Equipment be amended to provide for the assignment of Transportation Corps personnel in the Transportation Sections of the following type organizations of Army Ground Forces:

(1) Armies, army groups, and major and task forces: 24 officers and 29 enlisted men, and that the organization include administration, highway, rail, air and (for amphibious operations) water branches.

(2) Corps: three officers and four enlisted men for highway operations.

(3) Divisions: two officers and three enlisted men for highway operations.

d. The assignment or attachment of a Traffic Regulating Battalion, Transportation Corps, as organized under Table of Organization and Equipment 55-500, with a strength of 24 officers and 150 enlisted men be provided for each Army, for the performance of traffic regulating and movement control functions in Army areas.

e. The Staff Officers Field Manual 101-15 "Traffic Circulation and Control" and other applicable publications, be amended to provide for the delegation of authority for traffic circulation and control to the Transportation Officer, under the supervision of the Assis-

tant Chief of Staff for Supply, G-4.

f. Amphibian truck companies, Transportation Corps, should be attached to combat units when the tactical situation may involve water crossing.

g. Tables of Organization and Equipment of all motor transportation organizations, inclusive of battalion and company headquarters, be amended to provide long range, two-way, voice transmission, mobile radio equipment and operating personnel, to the extent of not less than one such unit to each company and battalion headquarters.

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5. Note on Service Troops, 12 Army Group G-4.

CHAPTER 8

THE SUPPLY OF THE TRANSPORTATION CORPS

SECTION I

PROCUREMENT

142 Initiation of the Supply Program.

a. The Supply Division of the Office, Chief of Transportation was activated late in 1943, shortly after the release of the outline plan for operation "Overlord".[1] Prior to this time, the supply organization of the Military Railway Service had performed the necessary supply functions for all of the Transportation Corps, including depot operations. It was evident from early studies of transportation requirements for the support of operations on the Continent that it would be necessary to provide for the rapid accumulation of equipment, not contemplated in the existing Tables of Organization and Equipment. The preparations of the Transportation Corps would include the procurement of equipment not yet manufactured in the Zone of the Interior, and from local sources in the United Kingdom. Much of the ground-work for railway equipment procurement had been done by the Military Railway Service and requisitions had been placed for freight cars and locomotives. The accumulation of these requirements for marine and motor transport operations, and the early procurement of necessary equipment, were the primary considerations.[1]

b. In the development of the supply program, it was decided in principle at an early stage that equipment should be procured for the particular phase and detail of the operation, rather than to attempt to provide it as organic to the units authorized that equipment. While this system tended to delay, to some extent, the early submission of requirements, it was an effective one, since the equipment could be tailored to the job without reference to authorized quantities based on Tables of Organization and Equipment. Thus, the necessary quantities of the major items of equipment were procured as Theater Projects ("PROCO"), as authorized by the War Department. All the major equipment required by the Transportation Corps for its operations was acquired in this manner. Organizational equipment, peculiar to the specific needs of each unit, was procured under Special Lists of Equipment.

143. Difficulties in Procurement. Many of the early difficulties in supply arose from critical production conditions existing in the United States. The War and Navy Departments were equally concerned in the maximum use of manufacturing facilities and raw materials. High priority for the production of landing craft--a critical requirement for the European Theater of Operations--was one of the principal causes for delay. The short supply of landing craft actually delayed the initiation of operations in the European Theater of Operations for a month.[2] Global requirements for all Theaters of Operations had to be considered; material had to be alloted on the basis of earliest needs, as determined by over-all planning and the distances from the manufacturing plants to consuming areas. These conditions brought about extensive substitution and radical departures from standardization, which was later to cause much difficulty. A desirable degree of standardization of equipment was not developed, but such was not possible because of the necessity for adopting equipment available in the Zone of the Interior. The nature of equipment of the Transportation Corps is such that there are many items which it uses in common with the

Navy and the Ordnance, Engineer, and Signal services. Where operational priorities for critical material gave precedence to those Services, substitutions were required and standardization was subordinated to the necessity of supplying of suitable equipment for the task.[3]

144. British Requirement and Aid. It should be remembered that the British Government had placed orders for large quantities of material for manufacture in the United States, through Lend-Lease. On the other hand, the Joint Stock Pile agreement required that the British and United States Forces would make certain equipment available for joint use. This included, especially, ferry craft and material for the construction of the artificial harbors contemplated for beach operations. It was from British sources, however, that the bulk of equipment for the water-borne activities of the Transportation Corps, not procurable in the United States, were obtained. The relatively large "naval stores" industry in the United Kingdom, an accompaniment of the largest maritime industry in the world, simplified the procurement problems for such material. It was even possible to obtain spare parts for marine engines used by both the British and United States Forces. The co-operation between our forces and those of Britain was of the highest order. In a like manner, the United States Navy, which was responsible for the procurement, storage, and issue of maintenance supplies and parts for marine engines, common to both the Army and Navy, assisted all through the campaign beyond its assumed obligations.

145. Procurement of Railway Equipment.[4]

a. For the conservation of ship space, all freight cars were shipped knocked down for assembly. Civilian labor was used, supplemented and supervised by Military Railway Service personnel.[5] While the car assembly program progressed satisfactorily, the rate of arrival in the United Kingdom was low. In the period 1 February to 30 June 1944, an average of only 40 per cent of requirements were available, of which half had been assembled. While 35-ton refrigerator and 40-ton tank car receipts were not favorable, it was reasonably certain that car deliveries, scheduled for offloading at Cherbourg (VO 1522), would be adequate to support the operations contemplated—even though captured or recovered equipment was not available in quantity.

b. The locomotive position was equally favorable with reference to deliveries. Approximately half of the number required was present in the United Kingdom at the end of March, 1944, and by 30 June 1944, a total of 1358 (type 2-8-0) and 362 (type 0-6-0) steam locomotives were available in the United Kingdom.

c. In order to supplement British railway facilities, then heavily overtaxed, a loan was made of locomotives and cars. A total of 400 road engines, 70 switching engines, 700 50-ton flat cars, 50 refrigerator cars, and 400 40-ton tank cars were turned over to the British railways stipulating that release could be required 14 days after notice.

146. Barge and Crane Program.

a. Plans for the movement of construction material and heavy off-guage engineer and port operating equipment involved the extensive use of barges. It was planned also to transport cargoes from the ships in the off shore anchorages by barge to the landing stages on the far shore. This equipment supplemented the amphibian

trucks and landing craft ear-marked for lighterage operations.[5]

b. There were two standard types of Transportation Corps barges available in quantity-the 60-foot wooden, knocked-down, prefabricated barge, originally developed for inland waterway use in the Pacific and China-Burma-India Theaters, and the 104-foot steel prefabricated barge adaptable equally to the transportation of liquid or deck cargoes. Approximately 400 of each type had been ordered, and delivery had been accomplished on all but a minor portion of the steel barges by 1 May 1944. Erection of these barges constituted a major industrial project, and at the height of production 3000 men were employed. A total of 120 of the steel units, and 220 of the wooden barges were scheduled for completion by 31 May 1944. A civilian shipbuilder was engaged, and after some discussion, agreed to supplement civilian labor with military personnel. Objections had been raised by union officials, and subsequently withdrawn through the efforts of the British Ministry of Labor. On 31 May 1944, a total of 400 wooden barges and 178 steel barges had been erected, and this fleet was assembled in the southwestern ports of England.

c. A similar program had been instituted in the erection of 30 and 60-ton floating cranes, also scheduled for use on the far shore. Again civilian facilities were placed at the disposal of the Transportation Corps, and Military personnel, chiefly from Port Battalions and the Railway Shop Battalions, were used.[6] By May, 1944, 17 of the 30-ton and five of the 60-ton floating cranes had been erected.

147. Procurement of Motor Transportation Equipment.

a. Requirements had been prepared and furnished to the War Department for equipping truck companies assigned to the Transportation Corps. A total of 240 companies had been estimated as the requirement, but approval was obtained for only 160 companies.[6]

b. Under the direction of the Chief of Ordnance, in Washington, a series of tests had been conducted at the Aberdeen Proving Grounds to determine the advisability and practicability of overloading the standard 2½-ton general purpose 6 x 6 cargo truck, to double its rated capacity. Upon the conclusion of 10,000 mile tests, no injurious effects had been observed, and authority was granted for such overloading, provided hard surfaced roads were used.[7]

c. It was originally planned to equip 26 of the truck companies with standard 2½-ton 6 x 6 cargo trucks. The allocation was increased to provide for 66 companies for the following reasons:

(1) The adoption of the skid-tank (750 gallon) provided for increased flexibility in the use of capacity, and it was decided to use the cargo truck in place of the standard 750 gallon tank truck for 21 companies.

(2) Decreases in the needs of the Engineers made it possible to reduce requirements for the long body cab-over-engine 2½-ton truck, originally scheduled for use by 36 companies, to 17 companies.

d. It had been further contemplated that 59 companies would be equipped with 10-ton flat-bed semi-trailers, truck-tractor

drawn. Procurement difficulties in the United States required that other available types be substituted and replacements in the 10-ton type would follow. It was therefore necessary to accept a substantial proportion of substitute types of equipment, as well as a limited number of the desirable 10-ton type. It was planned to provide two semi-trailers for each truck-tractor, to afford economy of power. It would have been more desirable to provide three semi-trailers for each power unit--one en route, one loading, and one discharging--based on an average of 40 power units (truck-tractors) per company.

e. It was planned to use the semi-trailer combination, both cargo and tanker types, for line of communications hauling, and to use th lesser capacity vehicles for lateral transport missions and in rough terrain in the forward areas, particularly for gasoline delivery beyond pipe heads. Tank transport trailers were to be used for port clearance of heavy out-of-guage cargoes, particularly Engineer equipment.

f. Bulk gasoline delivery required a large fleet of vehicles capable of cross-country movement for distribution in the forward areas. It was planned to use the portable 750 gallon skid tank to meet any increase in demand for this type of hauling above that provided by the deliberately limited capacity in the smaller type of tank trucks. These tanks could be skidded into the body of either the 2½-ton standard or cab-over-engine type trucks, thus augmenting the tanker vehicle fleet for specific situations demanding extreme mobility. At the destination, the tanks could be unloaded and used as a static supply source, and the vehicles again used for handling normal cargoes.

g. A review of the vehicle supply situation on 30 June 1944, (Table V) shows the relatively limited availability of the types considered necessary at the beginning of operations.

TABLE V

NUMBER OF TRUCKS AND TRAILERS AVAILABLE

30 JUNE 1944

	Required	Available
Semi-Trailer, 10 ton,	7,194	594
Truck-Tractor, 4 to 5 ton,	4,167	2,080
Semi-Trailer, 2000 gallon,	1,030	795
Trailer, 45 ton,	225	96
Prime mover, 12 ton,	114	96
Skid tanks, 750 gallon,	2,000	2,000
Truck, 2½ ton, 6 x 6, 750 gallon,	588	710
Refrigerator, Semi-Trailer, 5 ton,	75	75

h. Equipment supply improved markedly after 31 July 1944, but at that time, operations were critical and the short supply of the heavier types of equipment made itself felt to a considerable degree. This was particularly true in the case of the 10-ton semi-trailers. By the end of July, 1944, there were still less than 10 per cent of the required number of these units. Deliveries scheduled to complete the original order were not made until late in November, 1944, and some of these vehicles had been diverted to units other than the Transportation Corps. Wear and tear was excessively high

because of the intensive use of the limited stock of semi-trailers, and replacements were needed. An emergency order was placed for the expedited delivery of new vehicles.[8] The delay in receipt of these replacements resulted in loss of essential capacity during the late winter of 1944 and early part of 1945, when bulk capacity was critical.

SECTION 2

DEPOT OPERATIONS

148. Depot Installations.

a. With the mounting of operation "Overlord" came the first substantial difficulty. During the assault and support phases, the First Army was responsible for all administrative installations on the Continent. It had not contemplated the participation of the Transportation Corps beyond limited support of the Engineer Special Brigades in beach and minor port operation, and no Transportation Corps depots were provided in the beach maintenance areas, though provision was made for their establishment in Cherbourg (VO 1522). Separate depots were planned for railway supplies, especially locomotive and car parts. Marine depots, to be located in port areas, were to limit their stocks to marine items, together with general organizational equipment and supplies such as hand tools, rope, cable, and lifting gear, equally useful to all of the operational services.

b. Transportation Corps equipment was scheduled for early movement but when discharged from ships there was no definite place to put it because of the delay in the capture of Cherbourg. It was taken into Engineer and Ordnance depots, and left there or used by any organization that had need for it.[9] A considerable quantity of equipment for both the 11 Port and 4 Port was not only landed on the wrong beaches, but also placed in other Service depots. Some of it was recovered. Spare parts for Chrysler marine engines scheduled for Cherbourg discharge were landed at Barfleur (VO 3026) and Isigny (VT 5085) and lay there for a month before discovery in an Engineer dump.[9] Provision for the establishment of beach dumps at an earlier date would have been of considerable help. Poor documentation and inadequate packing also contributed to the misdirection and actual loss of equipment, particularly engine parts.[9]

c. After the establishment of a Transportation Corps dump near Bricquebec (VO 1304) about D + 30, the situation improved to some extent. By D + 90 a depot for marine parts and equipment was in the organization stage in Cherbourg. It was not until late in November, 1944, however, that these marine spare parts and equipment, all known to be in the European Theater of Operations and covered by shipping documents to the Continent, were assembled in the depot at Cherbourg. Meanwhile, the depot at Bricquebec had functioned satisfactorily, providing for storage and distribution of marine supplies in addition to railway supplies which constituted the bulk of its stock. Some difficulty arose from lack of experience and precedent.

d. As the base for operations moved further north, smaller depots, provisional for the most part, were established and small stocks of marine supplies were provided. The principal northern depot at Liege (VK 4727) was continued, primarily as a

railway supply point. Since the bulk of the harbor craft were required for operations in the Cherbourg (VC 1522)-Le Havre (VL 4027)-Rouen (VM 2817) area, and across the Channel at Southampton and Plymouth, the principal marine depot was retained in Cherbourg with a small subdepot at Rouen.

e. With the growth of emergency air shipments from the United States, designated to relieve pressure due to the inability to provide bulk shipment of certain critical marine and electrical parts, a small depot was established adjacent to Le Bourget airfield in Paris (VS 0544). It was found desirable to expand this depot to provide for supplying the needs of Antwerp (VT 6795), to which reasonably rapid rail shipment was available. At the conclusion of operations, this depot had grown to one of the principal supply points for marine and critical rail parts.

f. Experience indicated a generally satisfactory supply of depot operating equipment, except in the number of organic vehicles assigned. This was especially critical in the case of the marine depots, as it was necessary to deliver material from Cherbourg where the bulk of marine supplies had been moved late in 1944, to points as far distant as Antwerp (VJ 6795) and, for a short period to Marseilles (BT 4615). The considerable delay resulting from small lot rail shipments, common to marine supply, required that truck shipment be used.

g. As originally conceived, the base depot companies, which were to man the depots of the Transportation Corps, formed elements of the troop complement of railway grand divisions. They were to operate military railway depots, which were also charged with responsibility, for the storage and issue of all Transportation Corps items. At that time, the extensive nature of marine activities was not apparent. When it was evident that marine supplies would impose a work load of equal magnitude, it was decided to abandon the original concept of the base depot companies, and consider them as general Transportation Corps depot complement.[1] It was found that the fixed Tables of Organization for these units did not meet field requirements and it was necessary to separate units for manning small depots. Had a cellular organization been provided, it would have been possible to re-organize these units to meet requirements as they arose.

149. Difficulties in Stock Control.

a. Two major deficiencies were evident in the functioning of Transportation Corps supply, and both were due to lack of precedent. They were:

(1) Lack of stock catalogues, adequate drawings, and parts lists, interchangeability lists, maintenance factor lists, and standard nomenclature lists.

(2) Lack of personnel competent to identify technical equipment and supplies.

Both deficiencies were beyond the control of the Supply Division. Everything it was concerned with was new and untried, in a military sense, and not capable of immediate correction because the means for correction could be acquired only by experience.[1]

b. The lack of standardization of equipment, necessary by reason of production difficulties in the Zone of the Interior,

made the task of preparing stock lists, maintenance factors, and standard nomenclature lists especially difficult. Frequently, equipment was shipped without operating instructions and parts lists, which did not arrive until months after the equipment had been placed in service. In the cases where the parts lists were furnished they concerned only the main engines and one or two of the auxiliaries. These conditions made it almost impossible to establish accurate stock control records. Only when the manufacturer's own standards of parts identification had created a distinctive method of packing and marking was it possible to establish accurate identification and prepare accurate stock records. Both General Motors Corporation and Chrysler Motors provided good identification and protective packaging.[1]

c. The lack of trained personnel for the identification of technical equipment was always a source of trouble in depot operations especially in the case of diesel engine equipment and electrical control equipment. This condition, however, was remedied by the informal attachment of personnel from the operational services to the depots-- both rail and marine--and by assistance from technical representatives of the various engine manufacturers that had arrived in the European Theater of Operations in the period just following D + 30. These men performed a real service to the Army, as their technical knowledge was of great benefit to both supply and operating units.[10]

150. Control of Critical Material.

a. Neither the supply of spare parts nor the initial issue was adequate. The reason for this deficiency was the lack of availability in the Zone of the Interior. This was principally due to the necessity for the production of complete units to satisfy major requirements-and until those were completed, the production of parts had to wait.[3] Necessity for using equipment supplied by small manufacturing firms with limited production facilities, was further contributory to the causes outlined above.

b. Originally, all Transportation Corps equipment was ordered on a basis of the automatic supply of spare parts for a six months period-in some cases, for one year. They could not be furnished, at least in those proportions. Manufacturing difficulties caused lack of standardization in spare parts. Meanwhile the Supply Division of the Office, Chief of Transportation, Army Service Forces, had initiated a program, the purpose of which was to establish a list of maintenance factors for the "fast moving" parts of equipment furnished to the Transportation Corps and a standard nomenclature list.[3] The magnitude of this project is understandable when it is appreciated that over 120 types, sizes, and makes of internal combustion engines alone were under procurement. Obviously, the engines furnished in largest numbers were studied first. By December, 1944, the list available was applicable to the majority of types used in the European Theater of Operations and it became possible to adjust the factors in accordance with experience. In many cases, normal civil practice had been followed in establishing rates of replacement, particularly for the high speed engines used as prime movers for auxiliary electric generators-the greatest producer of dead-line reports. Deficiencies in stock levels were most common for this class of engine. In the majority of instances, however, the lists were reasonably adequate, and were the means of establishng more effective stock control procedure.

c. Because of the extremely short supply in the earlier

phases of operations, it was necessary to establish rigid control over the issue of spare parts for marine engines. While this procedure was responsible for a temporary increase in the number of inoperative harbor craft, it did have the beneficial effect of encouraging the repair, with civilian aid, of damaged elements to a far greater degree than would have been the case had the parts been more readily available. The result was that in February and March, 1945, the majority of deadlined craft were restored to operation by work performed in shops.[10] The development of diesel injector repair shops in the Normandy, Channel, and Delta Base Section areas greatly reduced requirements for replacement of these especially critical parts. As a result of this control, the stock levels in the depots improved. It was decided, however, to continue this program until the establishment of maintenance factors based on experience in the European Theater of Operations could be established on a more firm basis. This control program was continued up to VE-Day and depot stocks were maintained at satisfactory levels.[1]

151. Stock Levels. It was found from experience that it required approximately three months from the date of forwarding of a requisition to the receipt of the material in the European Theater of Operations. Stock levels were authorized for 60 days of supply, plus shipping time which averaged 30 days. After the initial stocking of the depots, replacement requisitions were forwarded based on actual consumption. Because of earlier delay in obtaining the replacement items, consumption exceeded the quantities furnished on the basis of the arbitrary maintenance factors that had been established, and a period of readjustment was necessary to build up stocks to desirable levels. This was generally accomplished by March and April, 1945, by reasons of improved procurement in the United States and augmentation from the resources of French and Belgian manufacturers.

152. Stocking of Railway Maintenance Items. When the Military Railway Service was finally granted a form of limited exempt status it was agreed that the Transportation Corps would stock certain items of Engineer supply in their depots. This material, consisting principally of rails, ties, switch gear, frogs, cross-overs, and other track equipment, provided for ordinary maintenance of way, which was a responsibility of the Military Railway Service. The availability of this material in the railway supply depots was advantageous. This procedure was the cause of some confusion, since War Department supply procedure continued to assign responsibility for this material to the Corps of Engineers. Where requisitions were placed on the United States, it was necessary to process them through the Engineers and to apply the tonnage against Engineer shipping allocation. This required that the Engineers, who naturally absorbed their total allocation for the shipment of material for which they continued to have primary supply responsibility, modify their requirements.

SECTION 3

CONCLUSIONS AND RECOMMENDATIONS

153. Conclusions.

a. The necessary degree of standardization of equipment was not developed, because of production difficulties in the United States, and the adoption of whatever equipment was available.

b. The extensive use of knock-down assemblies of major Transportation Corps equipment was economically sound, in that it provided for economy of shipping space and erection in areas most convenient to those in which their use was contemplated.

c. The supply of railway equipment was adequate at the start of operations. It was such that considerable assistance could be given to the British railways to implement their movement of United States supplies.

d. The supply of motor transportation, particularly in the heavy duty large capacity semi-trailers, was not adequate during early operations.

e. Early in the campaign, documentation accompanying shipments arriving in the European Theater of Operations was not adequate, nor was it properly safeguarded so as to insure its receipt.

f. The individual marking and identification of all items of supply is of the utmost importance. Early in the campaign, some items arrived in packages not well designed for protection from careless handling and corrosive action of the atmosphere.

g. Delay in furnishing stock lists for the identification of equipment and parts, resulted in retarding the establishment of adequate depot stock control records.

h. The supply organization, originally intended to serve only the Military Planning Service, was incapable of serving all of the operational services of the Transportation Corps.

i. Experience indicated that general depots were adequate for the supply of all of the operational services of the Transportation Corps. It was further desirable to establish depots, the stock of which would be required to supply the principal using service in convenient locations; that is, marine depots near ports, and railway depots in the railway network.

j. Supply officers for the operational services were not provided sufficiently early in operations to develop their full usefulness, except in the Military Railway Service.

k. The cellular type of organization is desirable for base depot companies.

l. There was a pronounced lack of personnel in depots capable of identifying mechanical equipment and parts.

m. Parts catalogues and identifying drawings, issued by manufacturers, were not furnished to the degree necessary until late in the campaign. Standardization would have eliminated this difficulty almost completely since in that case technical manuals could have been published earlier. Delay in furnishing such manuals was partly responsible for the high deadline level.

n. The supply of spare parts for all forms of transportation equipment was not adequate and was due to procurement difficulties in the United States.

o. The delay in arrival of spare parts for mechanical equipment resulted in lower stock levels in the depots than was

necessary to maintain equipment.

153. Recommendations. It is recommended that:

a. Studies be continued and field techniques improved for the adequate packaging and marking of all Transportation Corps supply items.

b. Studies be continued to improve stock control procedures in field installations.

c. Supply representation of the Transportation Corps be provided in all echelons of the Communications Zone, and in the Armies where required.

d. The Supply Division of the Transportation Corps be responsible for the supply of all of the administrative and operational Services of the Transportation Corps, for those items for which supply responsibility exists, and that it operate all depots of the Transportation Corps under the command of the Chief of the Supply Division of the highest Transportation Corps echelon.

e. That the cellular type of organization replace the fixed Table of Organization and Equipment of the base depot companies.

f. Courses be provided in Service Schools for Transportation Corps personnel in the identification of transportation equipment and material and supply procedure.

g. Equipment, when shipped to an overseas destination, be accompanied by not less than three copies of the following publications and drawings, packed and marked for ready identification; installation drawings; parts catalogues, with identifying stock numbers; operating instructions in detail, for major machinery items; and technical manuals, if existant. Further, that a limited number of the above documents precede the actual receipt of equipment, and be addressed to the Supply Officer who initiated the requisition.

h. Initial shipments of spare parts be computed on a basis of six months' maintenance, with replacements authorized after a period of 60 days, except in emergencies. Assuming 90 days from date of forwarding the requisition to the arrival of the material, a buffer stock of 30 days' supply be maintained to cover contingencies during early operations.

i. Initial shipments of spare parts and special tools be made so as to arrive simultaneously with the major items, but not as a part of the major item shipment, consigned directly to depots.

j. A permanent technical board be established within the Transportation Corps for the purpose of:

(1) Establishing military requirements and characteristics of all Transportation Corps equipment.

(2) Design and development of improved forms of Transportation Corps equipment in conjunction with the interested technical supply services.

(3) Providing for the maximum possible application of standardization.

(4) Analyzing the performance of all forms of transportation equipment to determine maintenance factors for the whole assembly, and its essential parts.

BIBLIOGRAPHY

1. Consolidated Historical Report on Transportation Activities Annex Number 3.

2. Official History, 12 Army Group, Part I.

3. Interview with Brigadier General Burton O. Lewis, Chief, Supply Division, Office Chief of Transportation, Army Service Forces, War Department, Washington, DC.

4. Historical Report of the Transportation Corps, Vol. VI January to March, 1945.

5. Historical Report of the Transportation Corps, Vol. II, January to March, 1944.

6. History of the Transportation Corps, Vol. III, April-June, 1944.

7. War Department Circular 212, 20 May, 1944.

8. Consolidated Historical Report on Transportation Corps Activities, Annex Number 8.

9. Historical Report of the Transportation Corps Vol. IV, July to September, 1944.

10. Observations of Lt. Col. W. F. Schultz, Jr., then Chief, Harbor Craft and Repair Branch, Marine Operations Division, Office Chief of Transportation, Communications Zone, European Theater of Operations.

APPENDIX 1

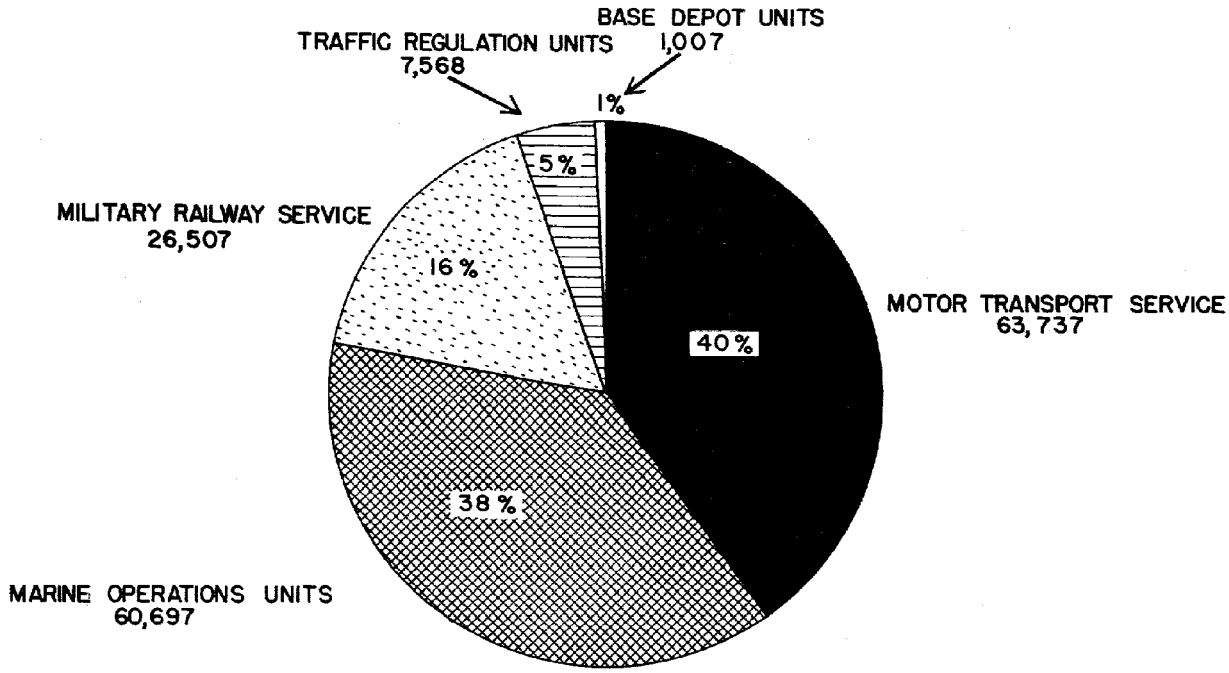
STATISTICAL CHARTS

1. The appended statistical charts illustrate graphically the operations of the Transportation Corps in the European Theater of Operations.

2. They were prepared by the Statistics Branch, Planning and Control Division, Office Chief of Transportation, Communications Zone, European Theater of Operations.

3. The period for which the charts apply includes operations prior to the invasion of the Continent, and those subsequent to that date, terminating on 8 May 1945.

TRANSPORTATION CORPS PERSONNEL IN E.T.O.



TOTAL—159,516 OFFICERS AND ENLISTED PERSONNEL

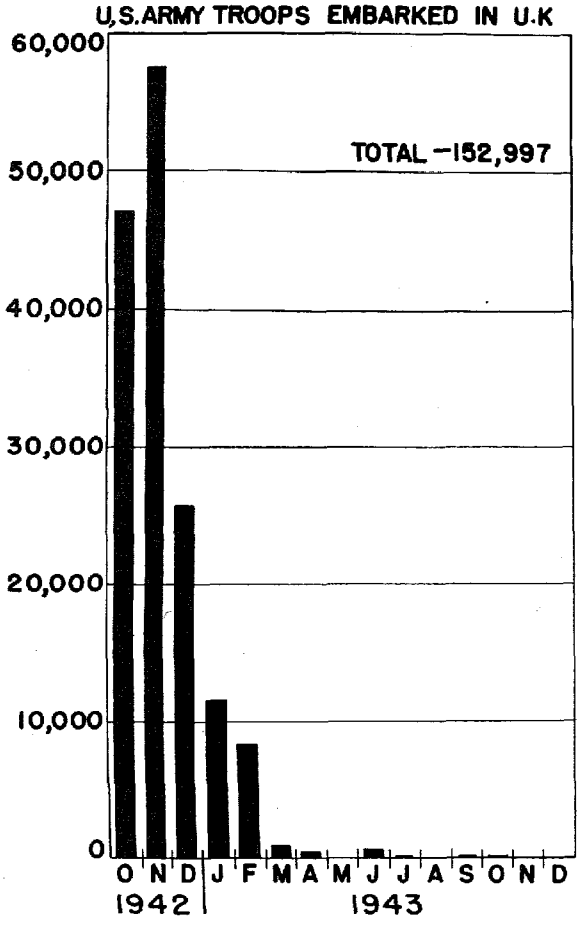
AS OF 30 APRIL 1945

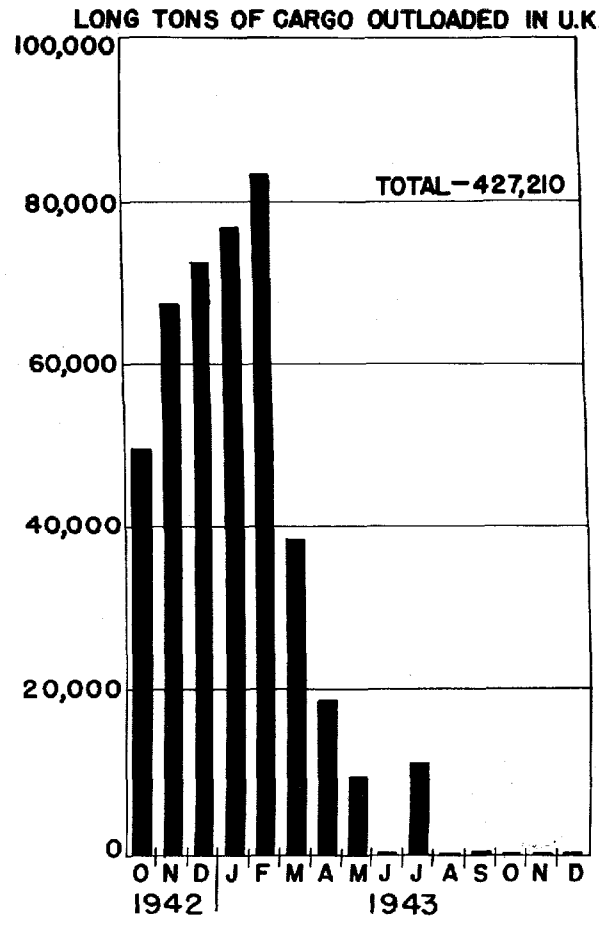
AGPO 12-45/300218 STATISTICS BRANCH T.C.

APPENDIX I

2

NORTH AFRICAN INVASION



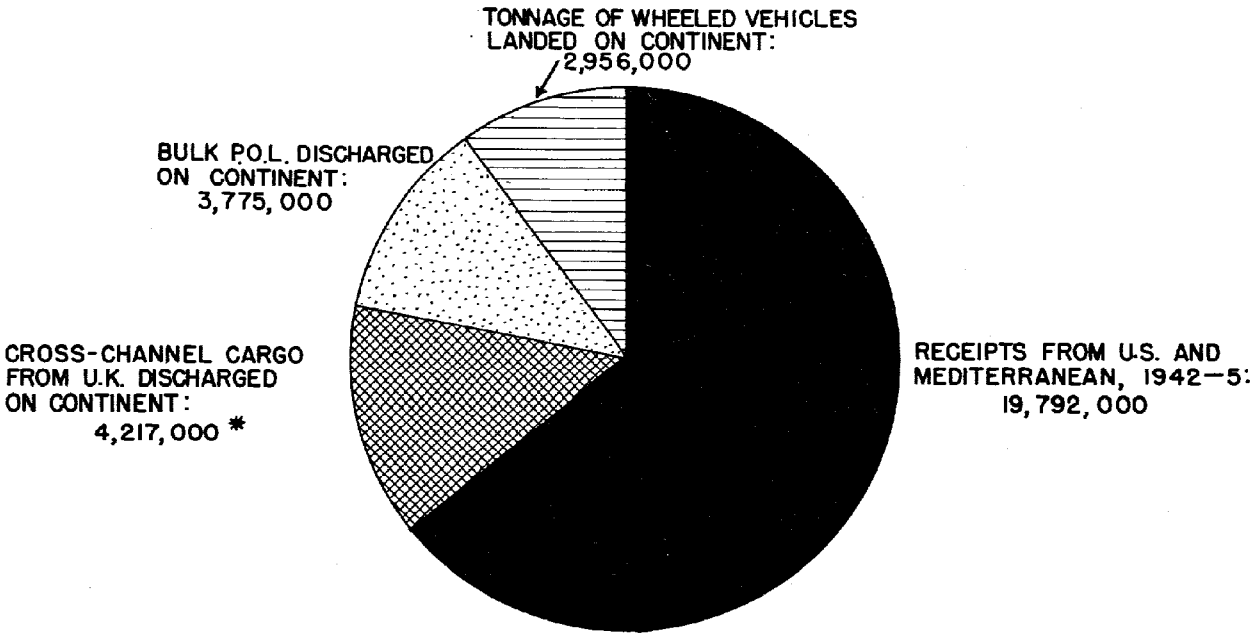


APPENDIX I

AGPD 22-95/300/2188 STATISTICS BRANCH T.C.

TOTAL CARGO HANDLED

LONG TONS



TOTAL—30,740,000

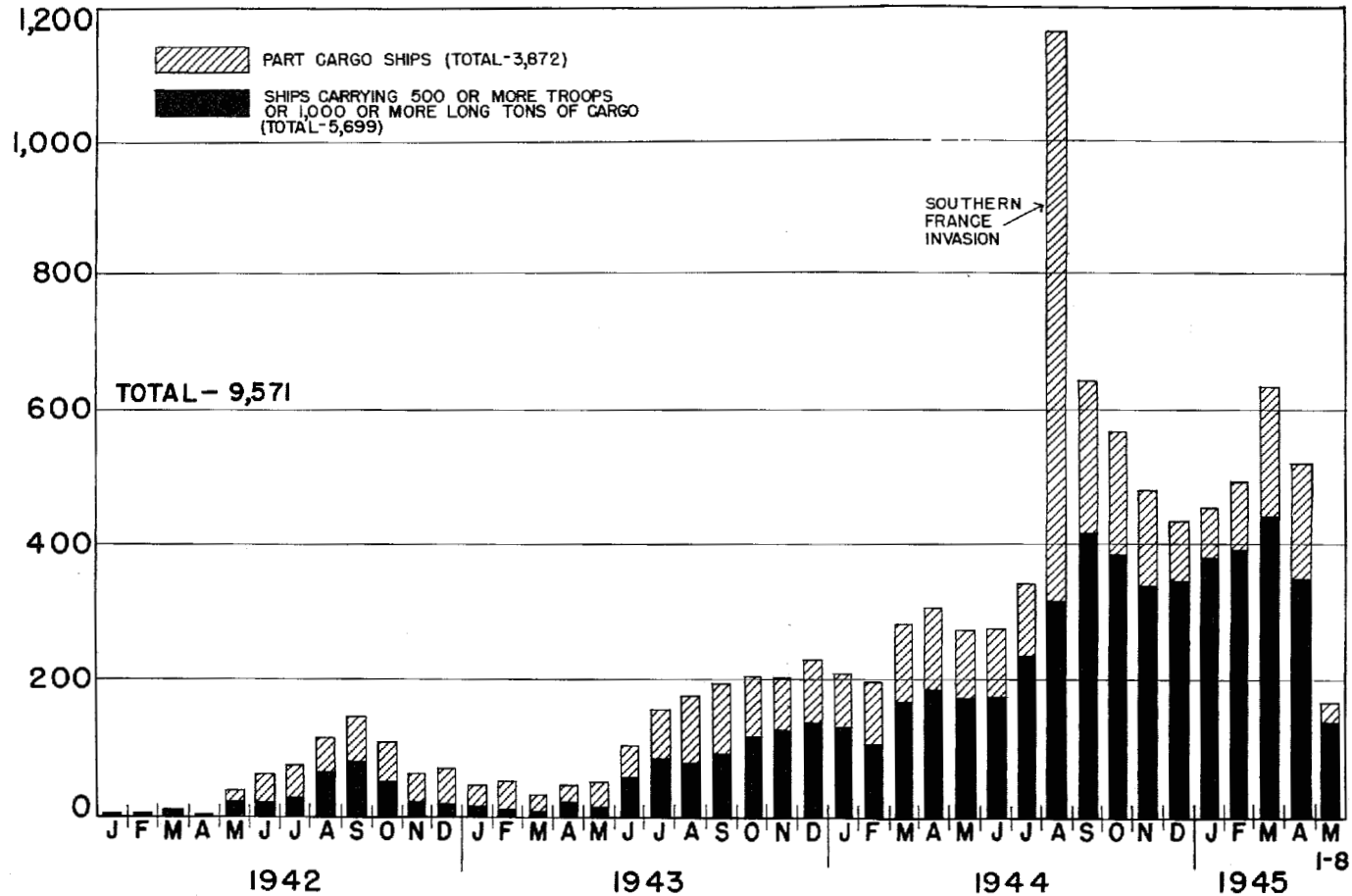
* INCLUDES APPROXIMATELY 1,151,000 TONS OF COAL AND RAILWAY ROLLING STOCK.

UP TO 8 MAY 1945

A&PD 12-45/300/2186 STATISTICS BRANCH T.C.

APPENDIX I

MONTHLY SHIP ARRIVALS IN E.T.O.

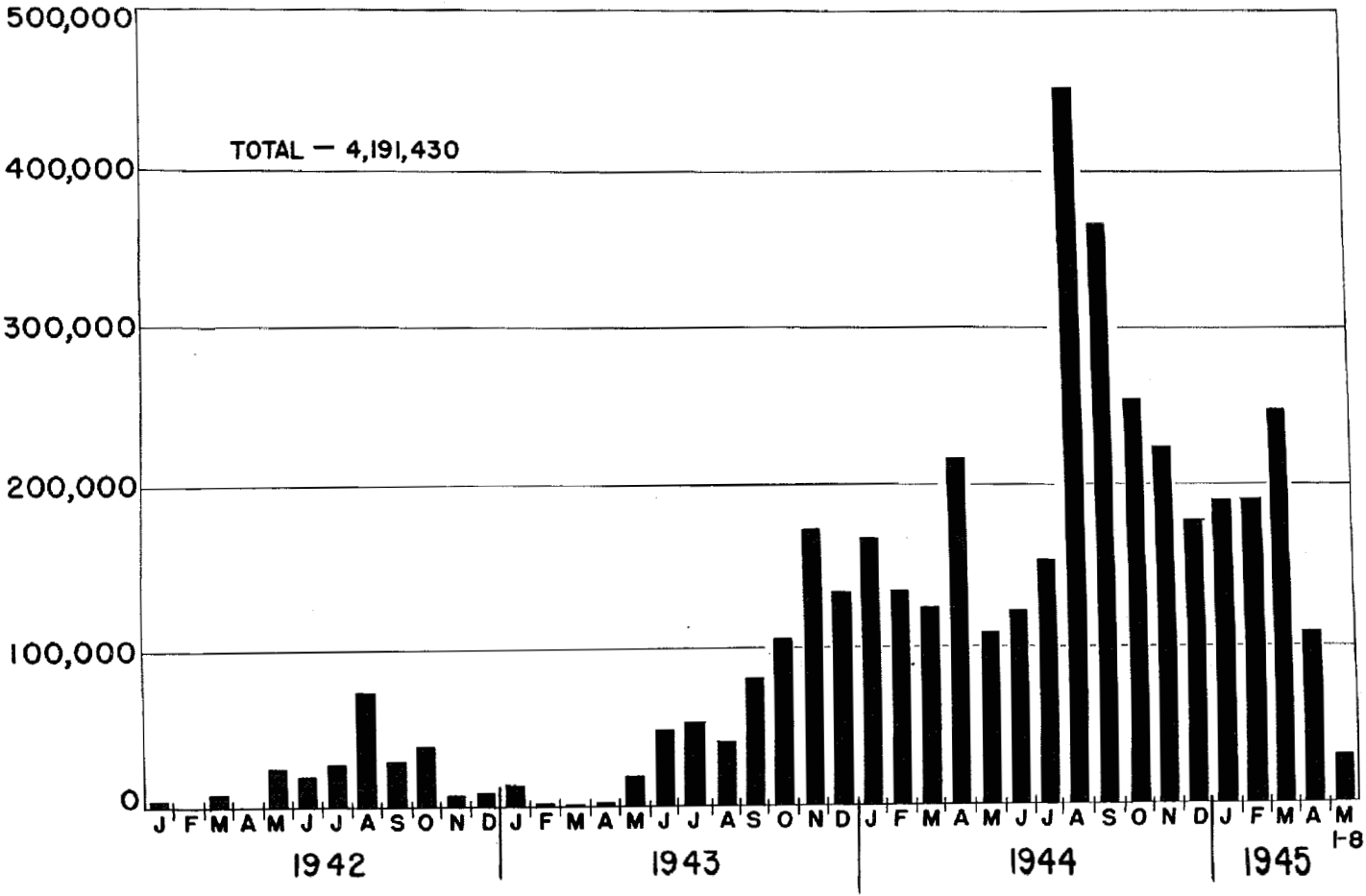


FIGURES DO NOT INCLUDE CROSS-CHANNEL MOVEMENT.

AGPD 12-45/300/2186 STATISTICS BRANCH T.C.

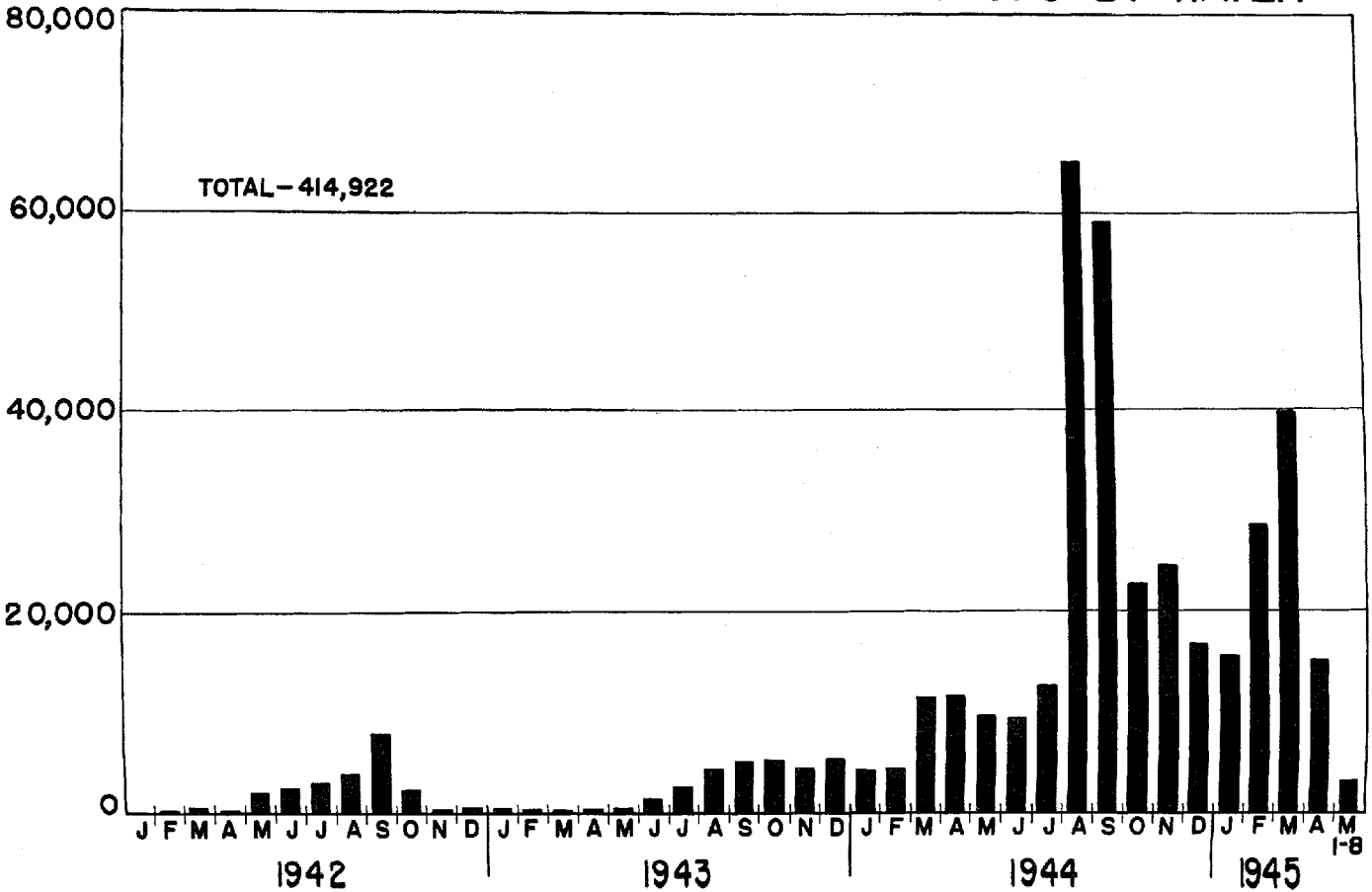
APPENDIX I

U.S. ARMY TROOPS ARRIVED IN E.T.O. BY WATER



AGPD 22-45/300/2188 STATISTICS BRANCH T.C.

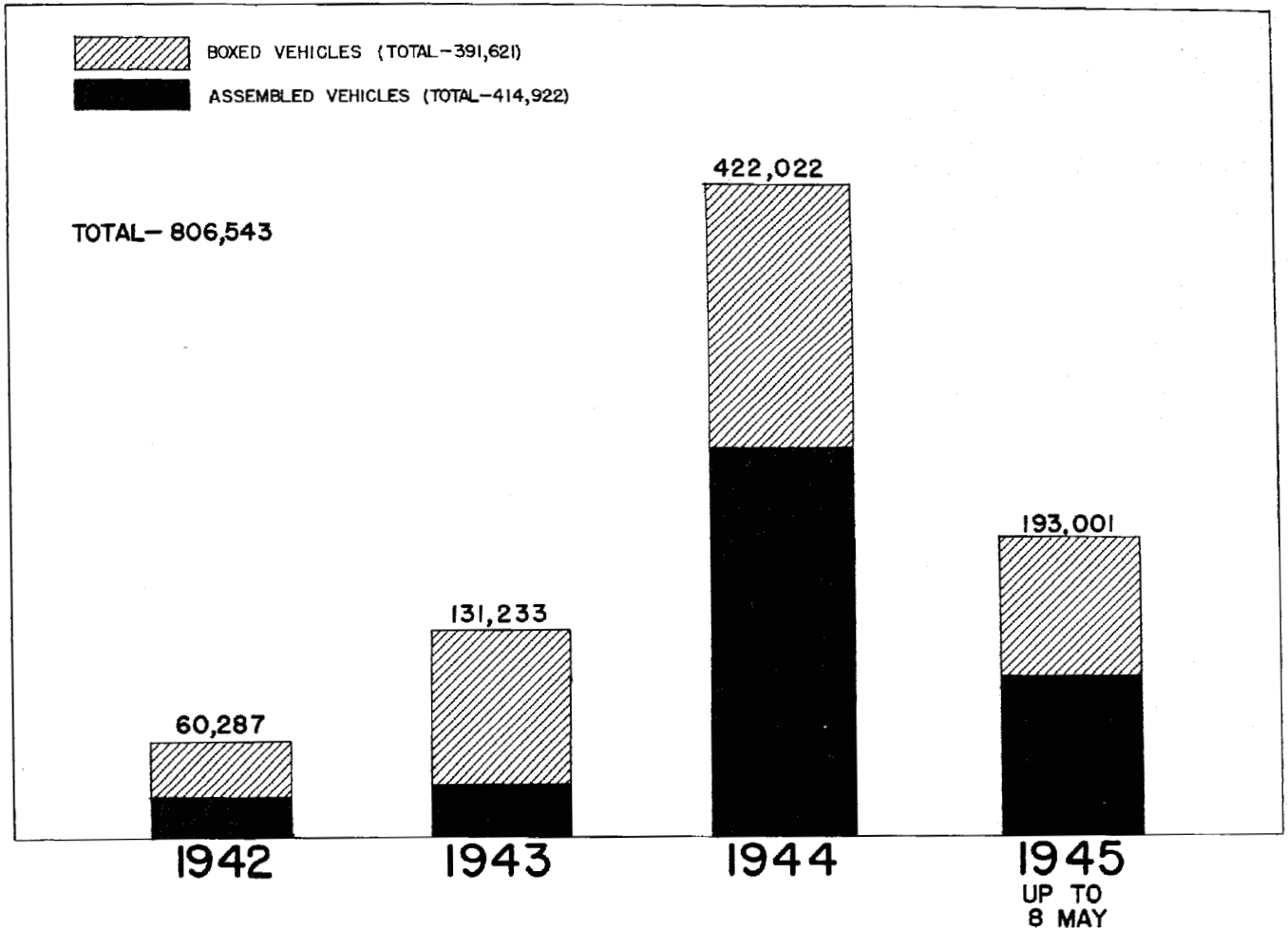
ASSEMBLED VEHICLES ARRIVED IN E.T.O. BY WATER



APPENDIX I

AGPO 12-45/300/21.88 STATISTICS BRANCH T.C.

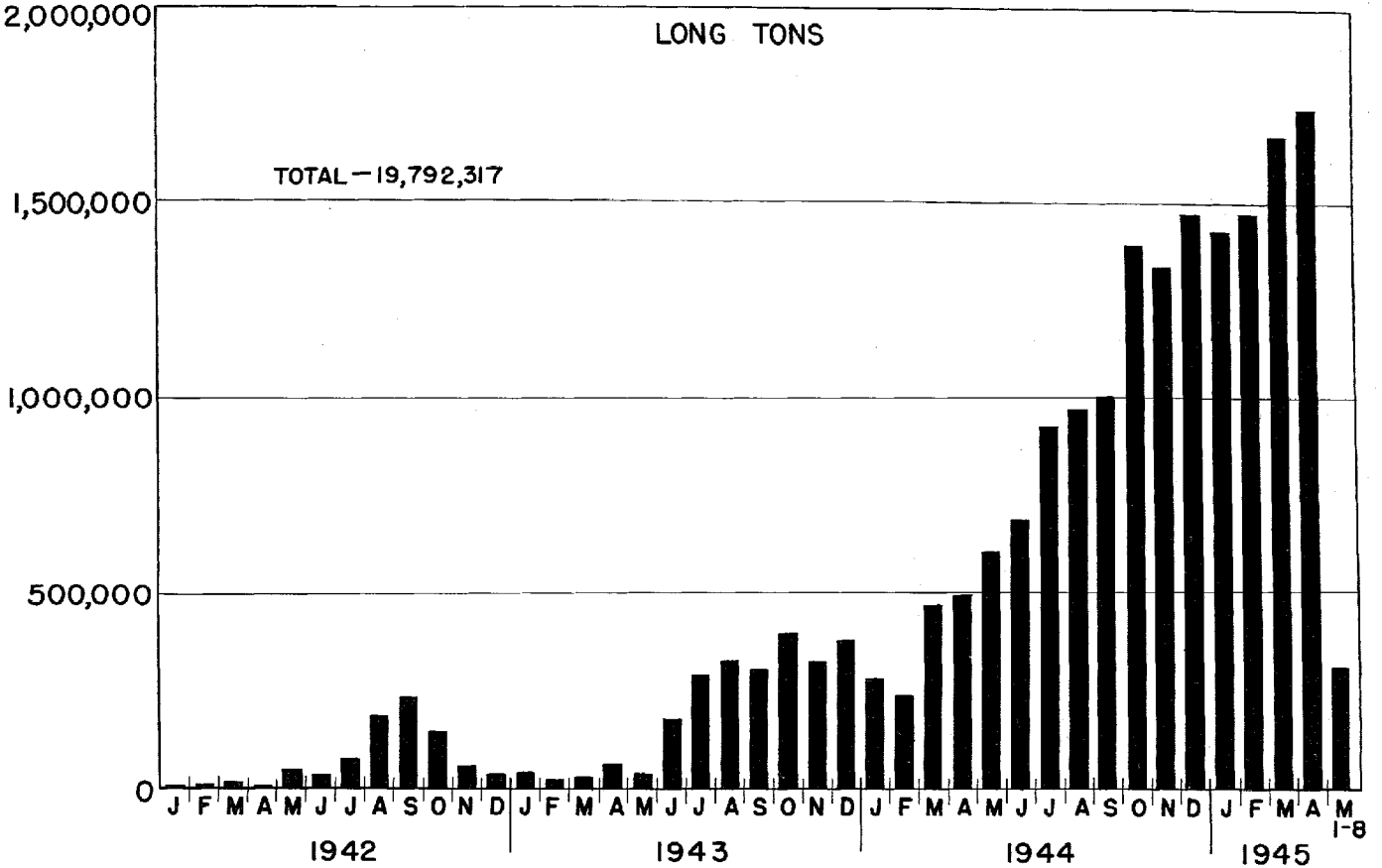
TOTAL VEHICLE RECEIPTS IN E.T.O.



AGPO 22-45/300/2188 STATISTICS BRANCH T.C.

APPENDIX I

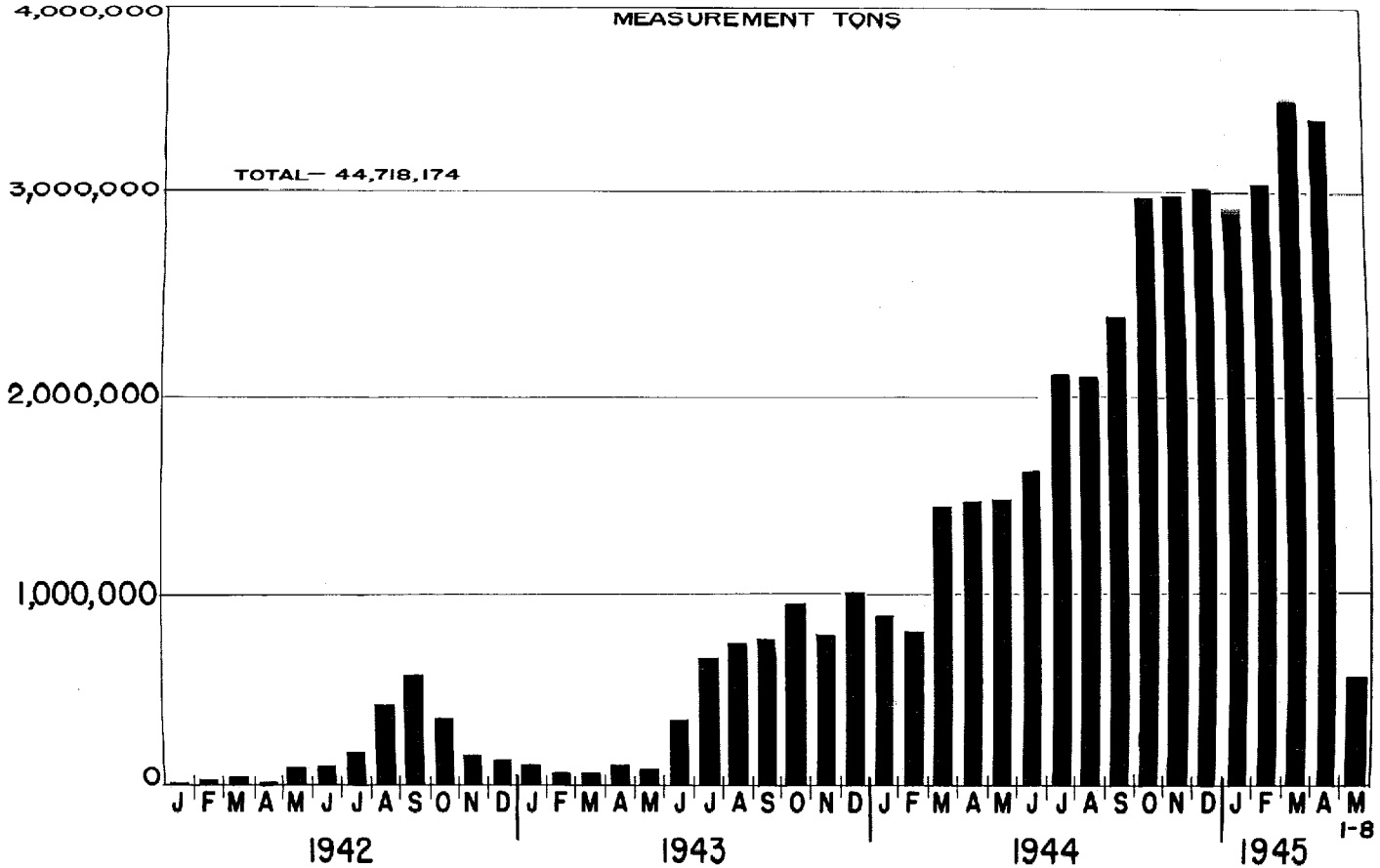
U.S. ARMY CARGO ARRIVED IN E.T.O. BY WATER



AGFD 12-45/300/2168 STATISTICS BRANCH T.C.

APPENDIX I

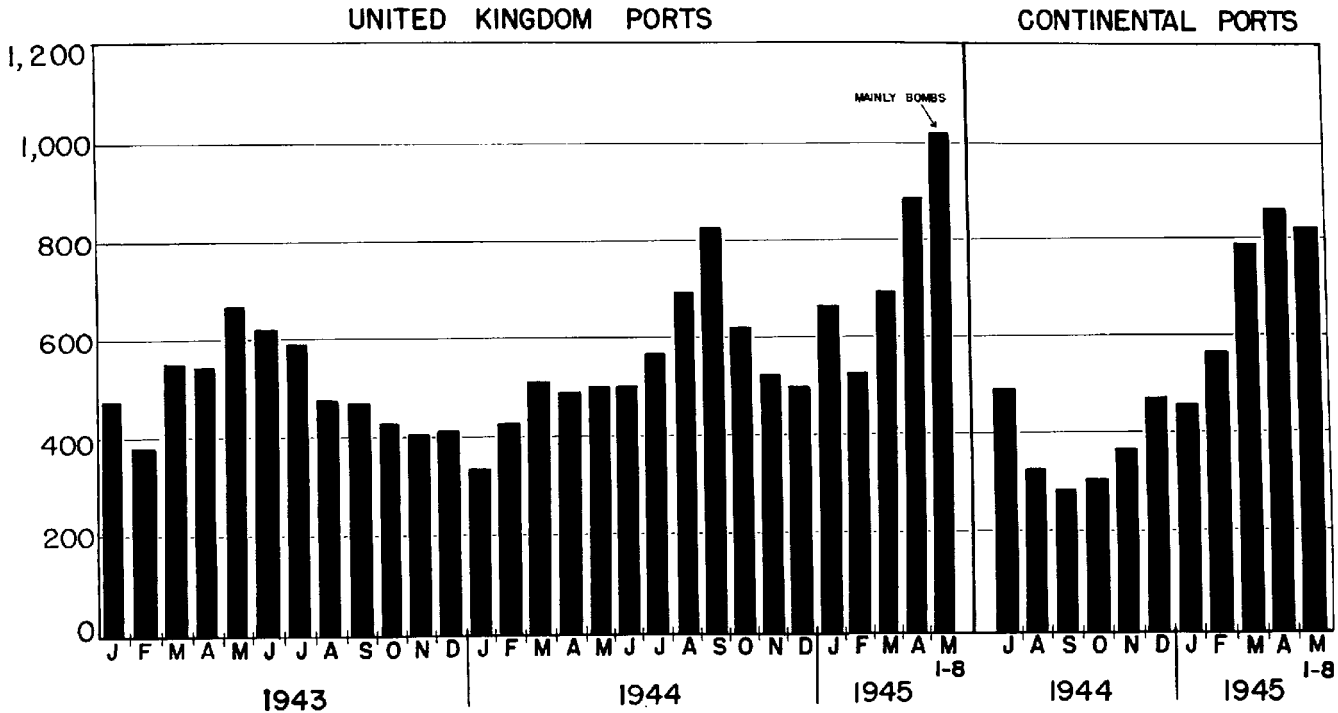
U.S. ARMY CARGO ARRIVED IN E.T.O. BY WATER



AGPO 32-45/3800/2188 STATISTICS BRANCH T.C.

LONG TONS DISCHARGED PER SHIP PER DAY

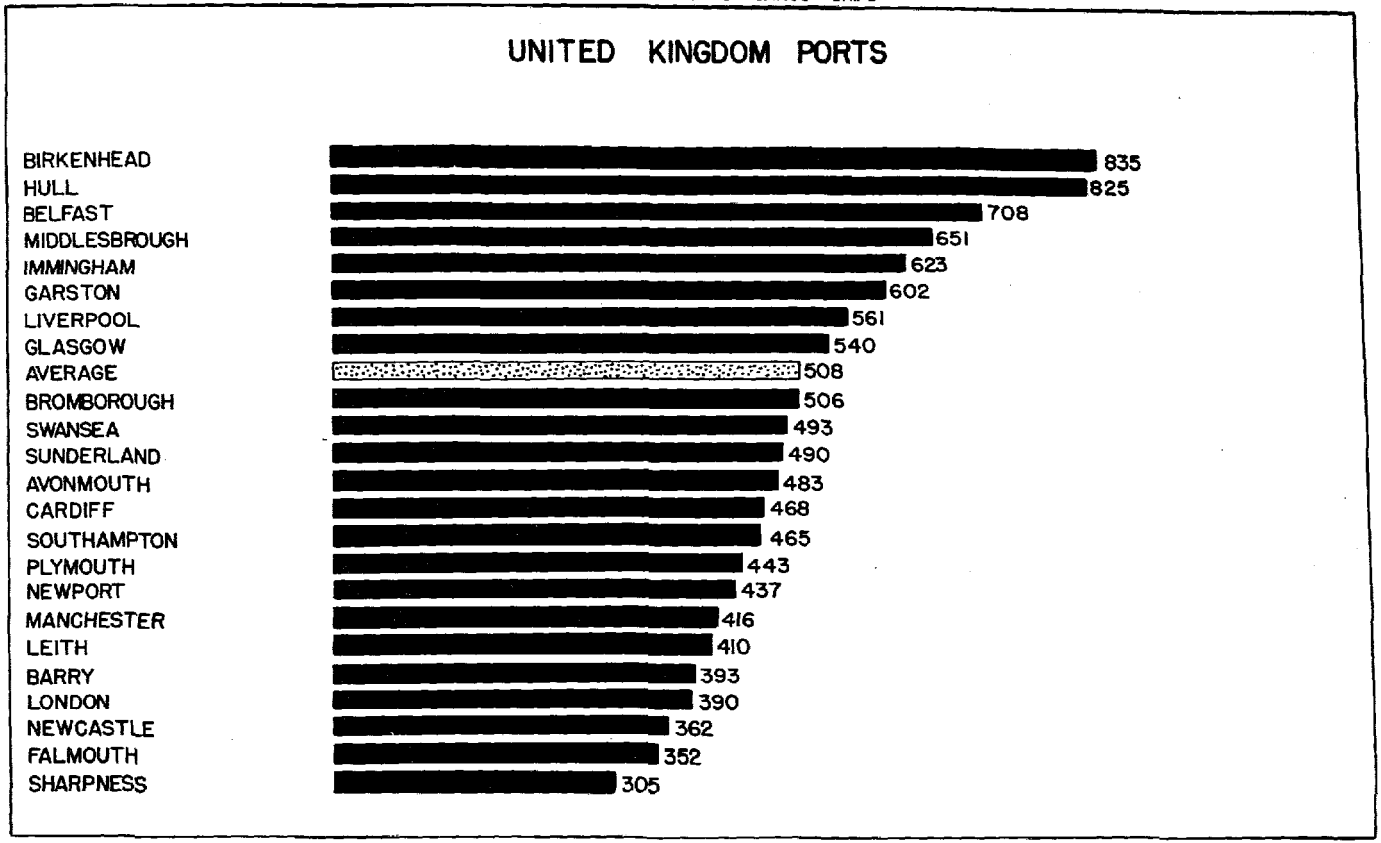
FROM U.S. LOADED FULL CARGO SHIPS



AGPD 22-45/3600/2188 STATISTICS BRANCH T.C.

LONG TONS DISCHARGED PER SHIP PER DAY

FROM U.S. LOADED FULL CARGO SHIPS



1 JANUARY 1943 TO 8 MAY 1945

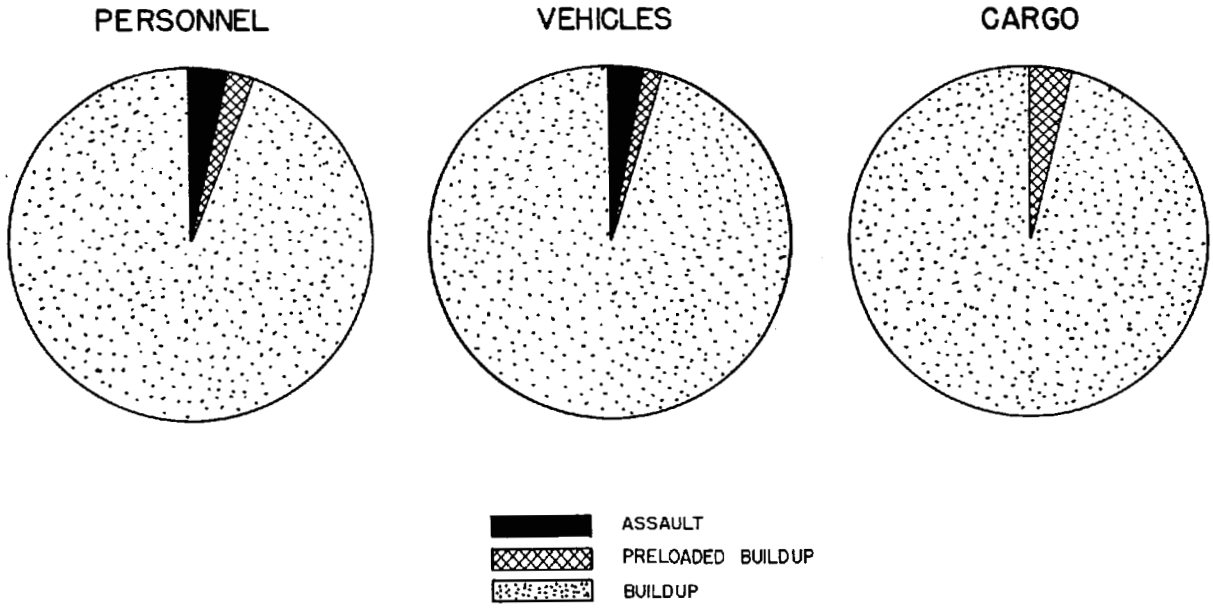
AGPO 12-45/300/2188 STATISTICS BRANCH T.C.

APPENDIX 1

12

CROSS-CHANNEL INVASION OF CONTINENT

U.S. ARMY



	PERSONNEL	VEHICLES	CARGO LONG TONS
ASSAULT	90,562	11,850	—
PRELOADED BUILDUP	44,054	6,499	108,182
BUILDUP	2,345,816	404,259	2,957,500
TOTAL	2,480,432	422,608	3,065,682

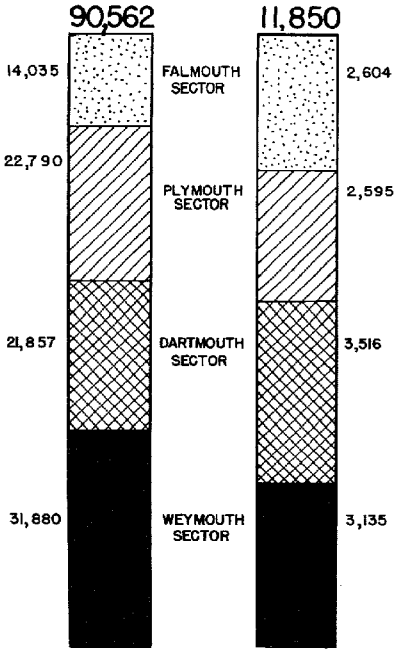
U. K. LOADINGS TO 8 MAY 1945

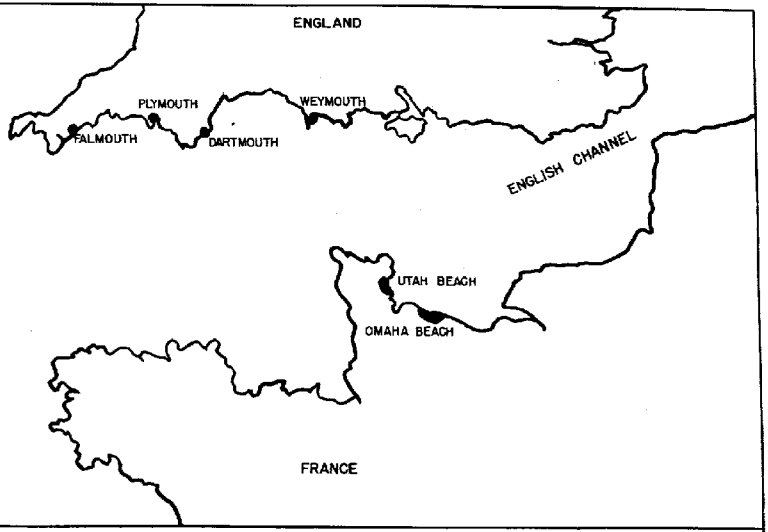
ASPO 32-45/300/2188 STATISTICS BRANCH T.C.

APPENDIX A

13

LOADING OF U. S. ASSAULT FORCES FOR NORMANDY INVASION





SHIPS AND CRAFT FOR ASSAULT

LCT - LANDING CRAFT, TANK	330	XAPA - 535 FOOTER	3
LST - LANDING SHIP, TANK	106	LCH - LANDING CRAFT, HEADQUARTERS	3
LCI - LANDING CRAFT, INFANTRY	89	LSH - LANDING SHIP, HEADQUARTERS	1
LSI - LANDING SHIP, INFANTRY	9	LSD - LANDING SHIP, DOCK	1
APA - 535 FOOTER	7		

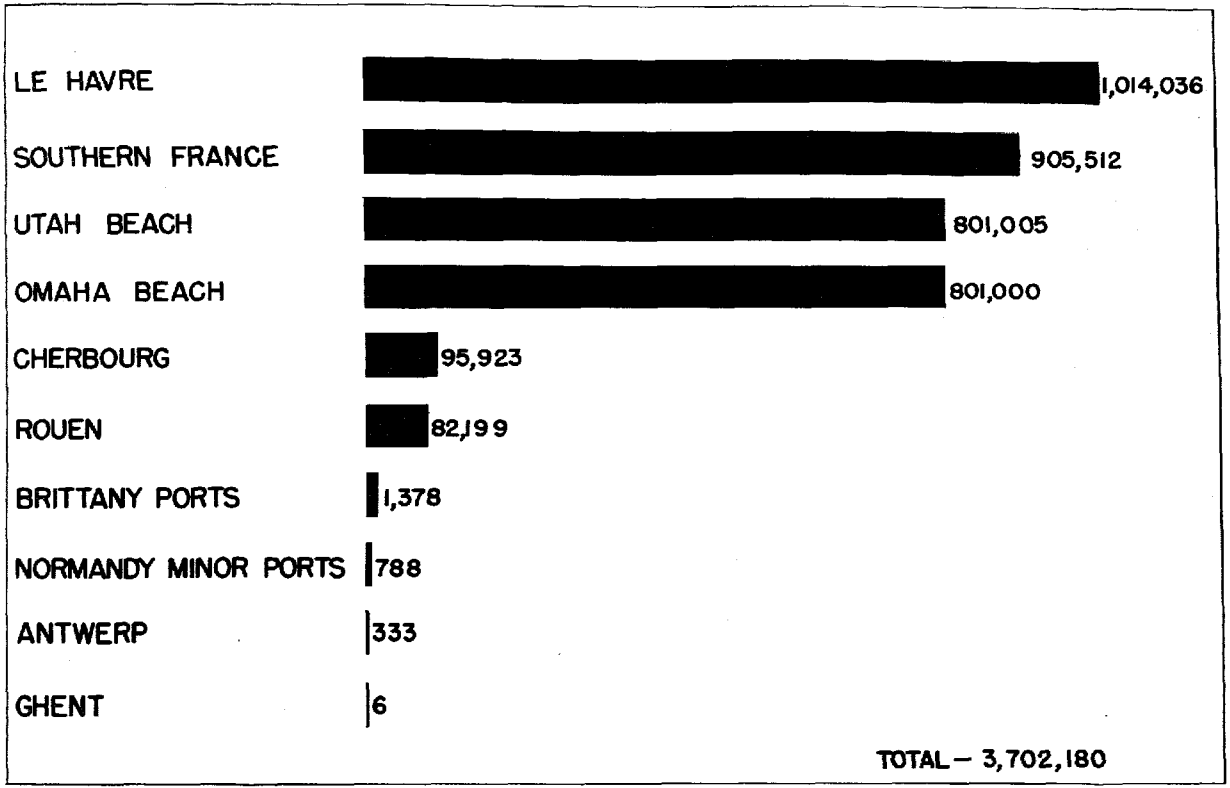
TOTAL - 549

JUNE 1944

AGPO 32-45/300/2188 STATISTICS BRANCH T.C.

APPENDIX II

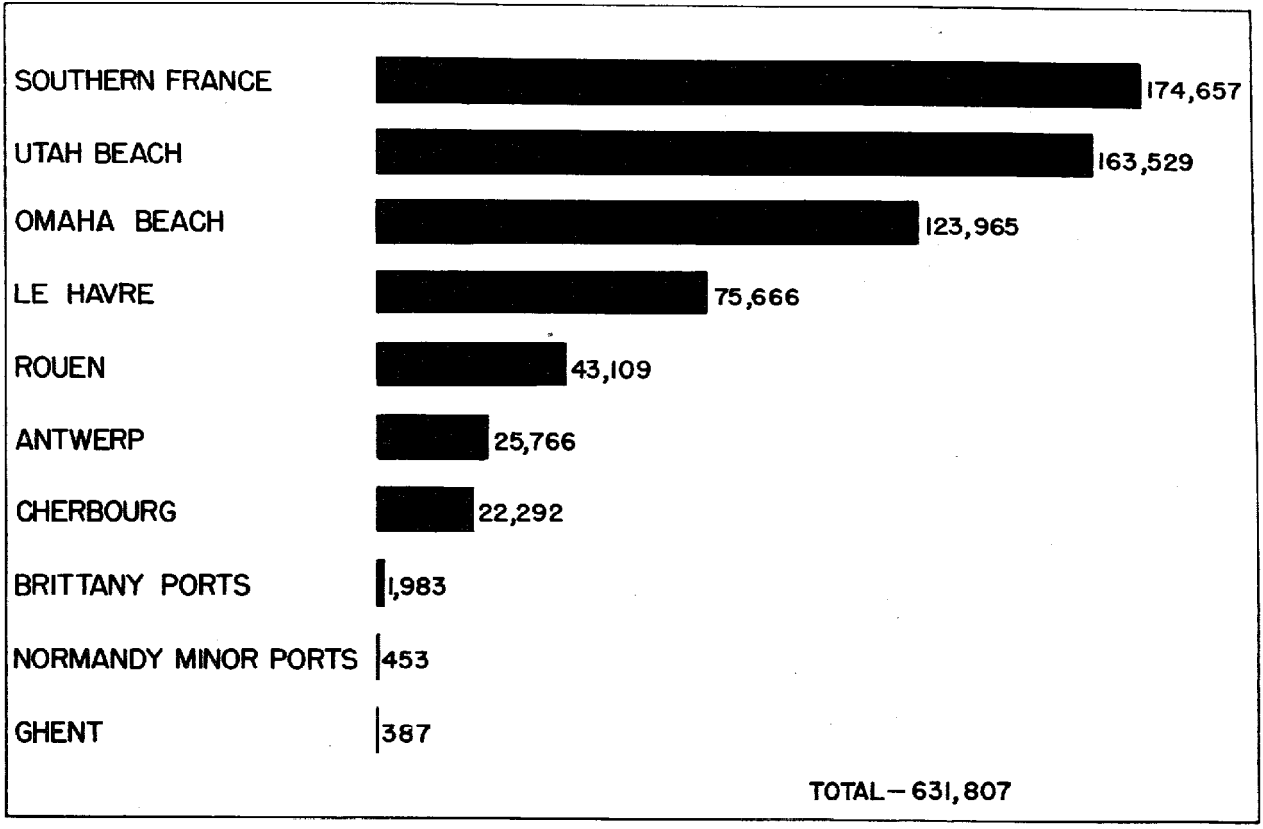
PERSONNEL DEBARKED IN FRANCE AND BELGIUM



6 JUNE 1944 – 8 MAY 1945

AGPD 12-45/300/2188 STATISTICS BRANCH T.C.

ASSEMBLED VEHICLES LANDED IN FRANCE AND BELGIUM

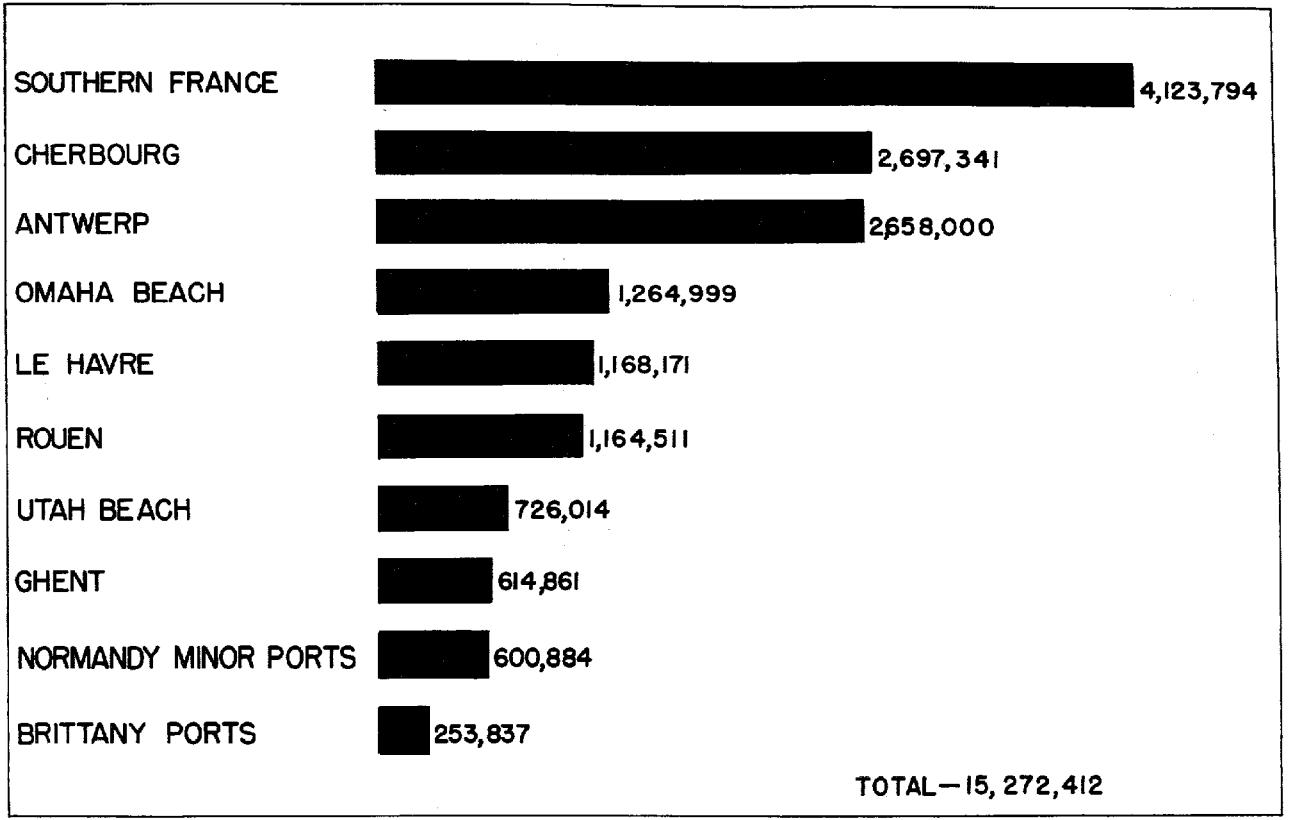


6 JUNE 1944 – 8 MAY 1945

AGPD 12-45/300/2188 STATISTICS BRANCH T.C.

APPENDIX 1

LONG TONS DISCHARGED IN FRANCE AND BELGIUM



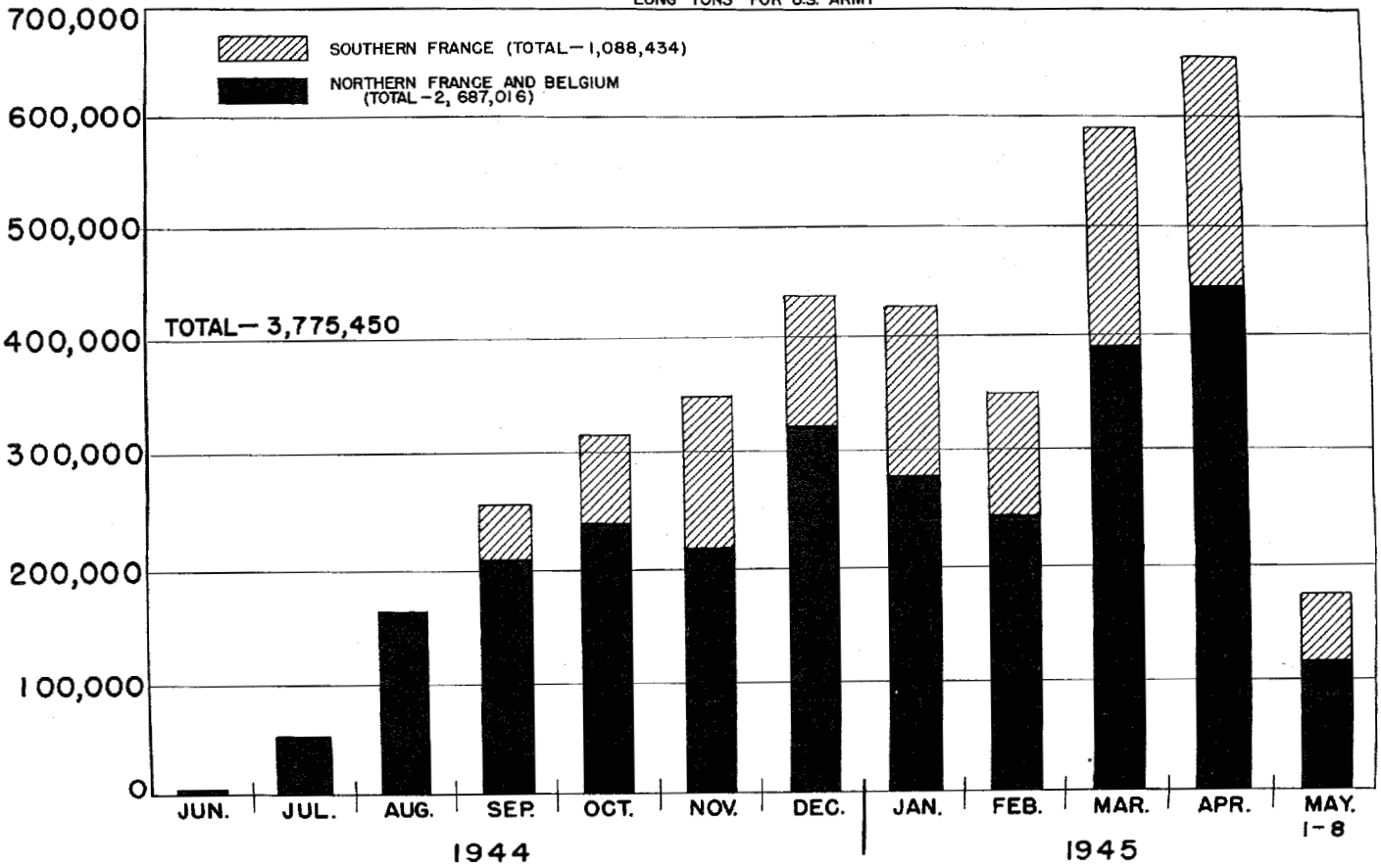
6 JUNE 1944 – 8 MAY 1945

AGPO 32-45/309/2288 STATISTICS BRANCH T.C.

APPENDIX

BULK P.O.L. DISCHARGED ON CONTINENT

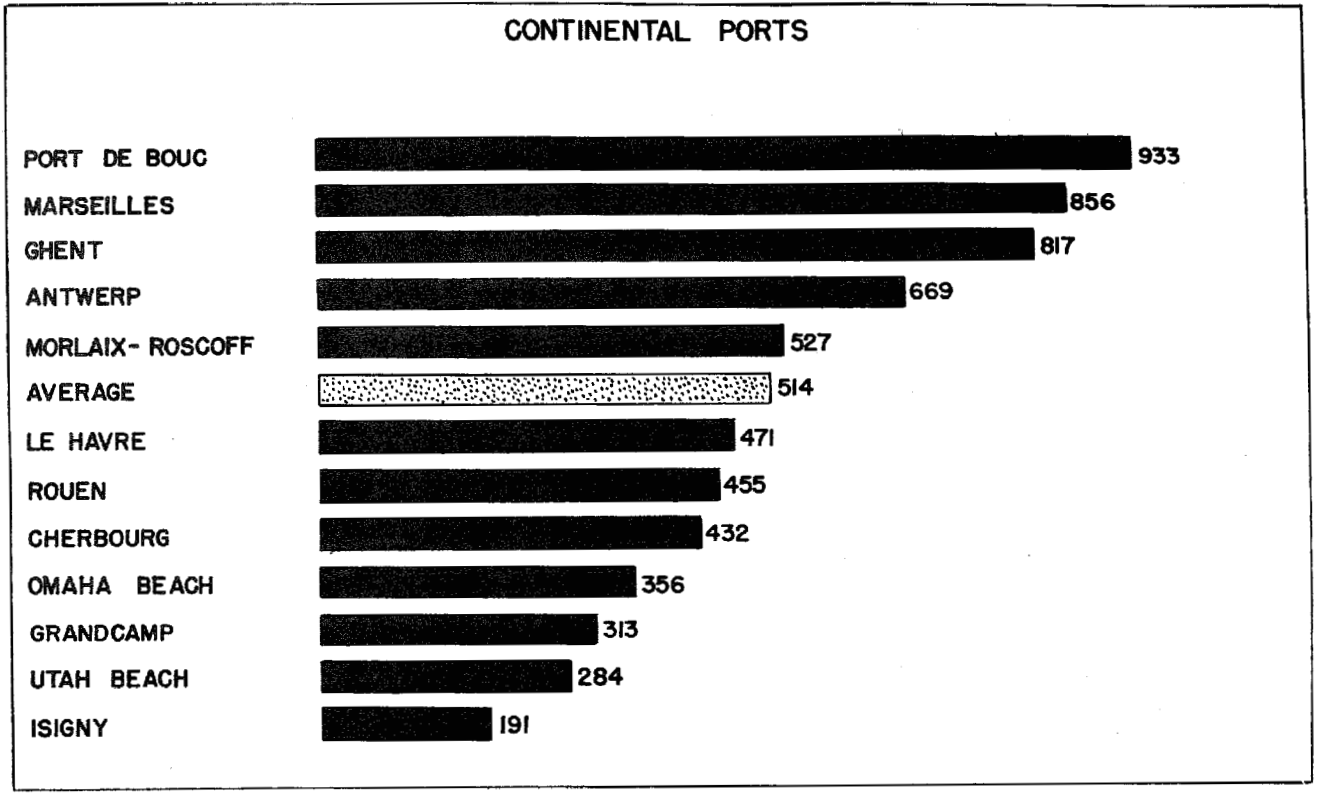
LONG TONS FOR U.S. ARMY



AGPO 22-55/500/2188 STATISTICS BRANCH T.C.

LONG TONS DISCHARGED PER SHIP PER DAY

FROM U.S. LOADED FULL CARGO SHIPS

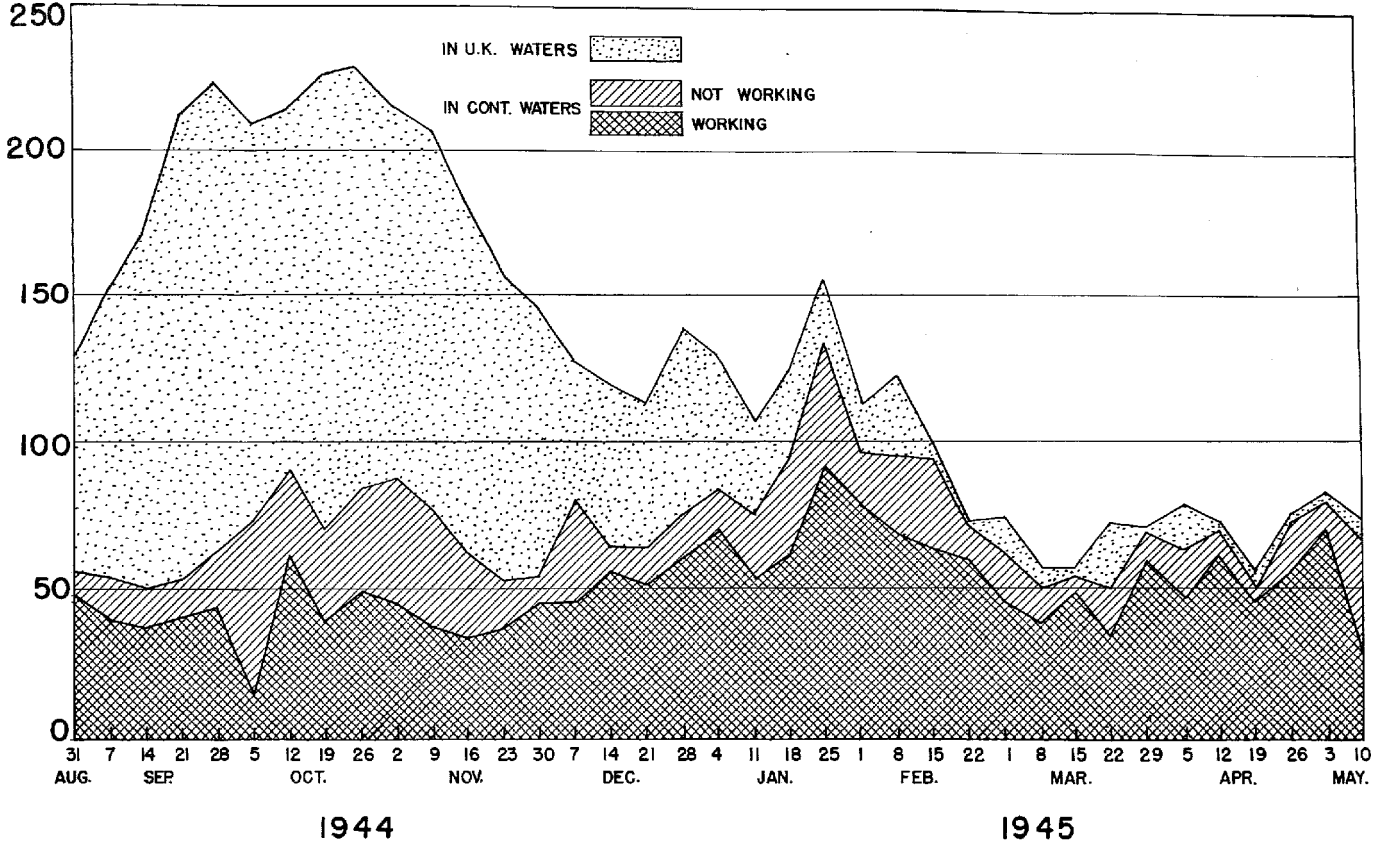


6 JUNE 1944 TO 8 MAY 1945

AGPO 12-45/300/21.M STATISTICS BRANCH T.C.

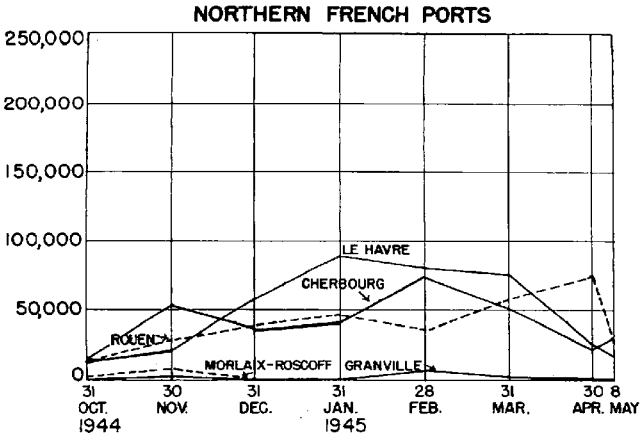
APPENDIX I

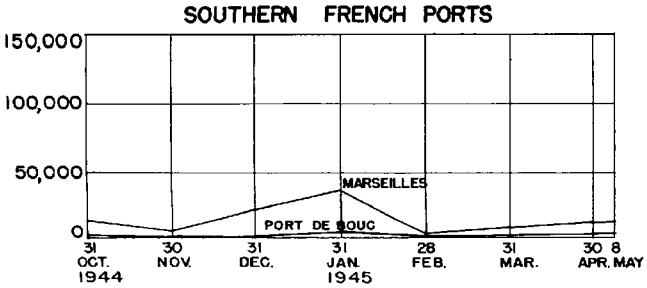
U.S. COMMODITY-LOADED SHIPS IN U.K. AND CONTINENTAL WATERS

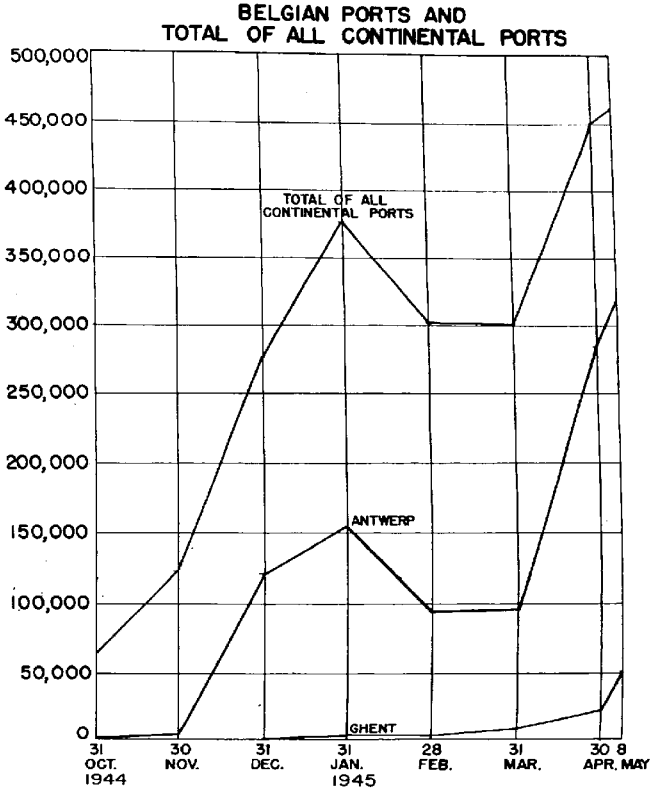


AGPO 22-45/30/2188 STATISTICS BRANCH T.C.

PORT BACKLOGS - LONG TONS AWAITING CLEARANCE







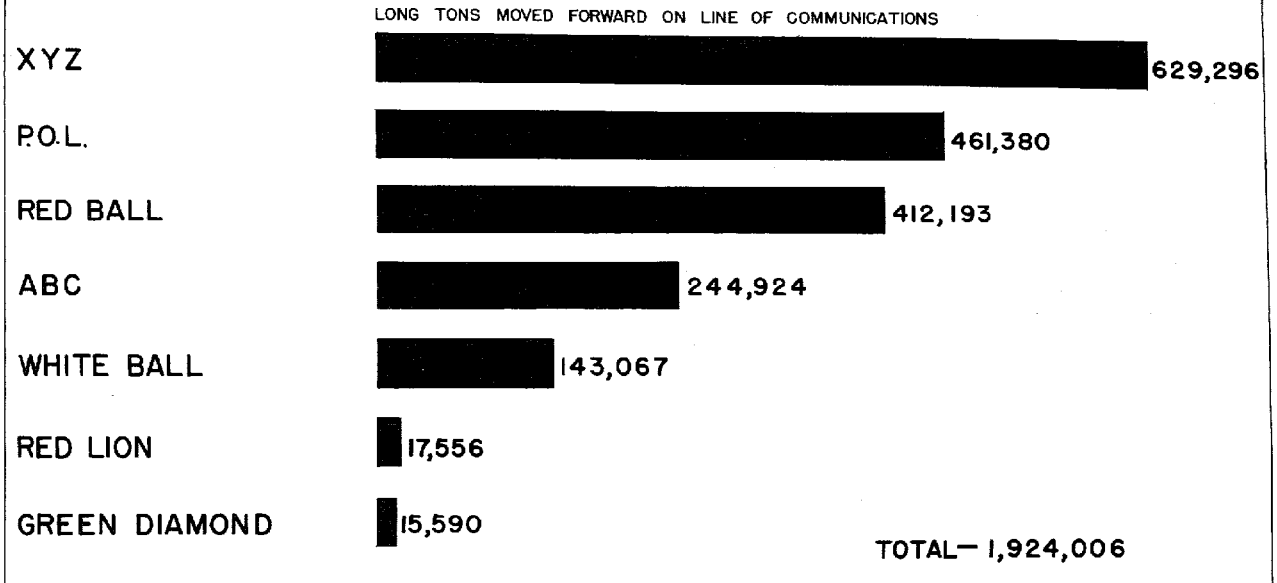
NOTE: DATA NOT AVAILABLE FOR OMAHA AND UTAH BEACHES.

ARPD 12-45/300/2188 STATISTICS BRANCH T. C.

APPENDIX I

21

MOTOR TRANSPORT SERVICE EXPRESS HAULS



DATES OF OPERATION	HAUL	DESCRIPTION OF OPERATIONS
25 MAR. '45 — 8 MAY '45*	XYZ	FORWARD DELIVERIES TO ARMIES IN GERMANY EAST OF THE RHINE.
14 JUN. '44 — 28 FEB. '45	P.O.L.	FORWARD DELIVERIES FROM PIPEHEADS TO ARMIES AND AIR FORCE.
25 AUG. '44 — 13 NOV. '44	RED BALL	FROM CHERBOURG PENINSULA TO ARMIES ACROSS NORTHERN FRANCE.
30 NOV. '44 — 26 MAR. '45	ABC	FROM PORT OF ANTWERP TO LIEGE — CHARLEROI — MONS DEPOT AREA.
6 OCT. '44 — 10 JAN. '45	WHITE BALL	FROM PORTS OF LE HAVRE AND ROUEN TO INTERMEDIATE DEPOTS.
16 SEP. '44 — 12 OCT. '44	RED LION	FROM BAYEUX TO BRUSSELS (U.S. AND BRITISH TONNAGE).
14 OCT. '44 — 1 NOV. '44	GREEN DIAMOND	FROM CHERBOURG PENINSULA TO AVRANCHES AND DOL RAIL LOADING POINTS.

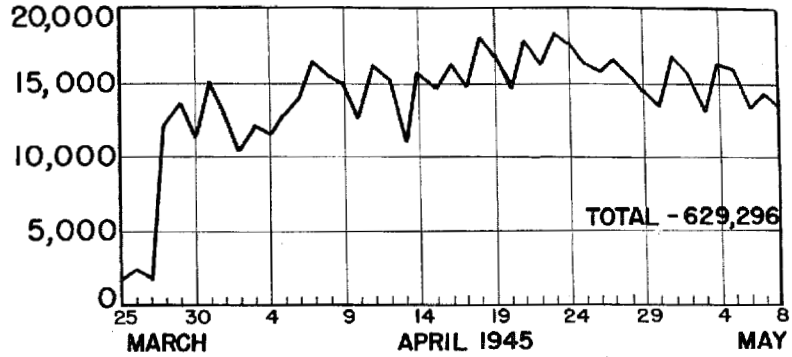
*CONTINUED AFTER V-E DAY

ABPD 32-45/399/2166 STATISTICS BRANCH T.C.

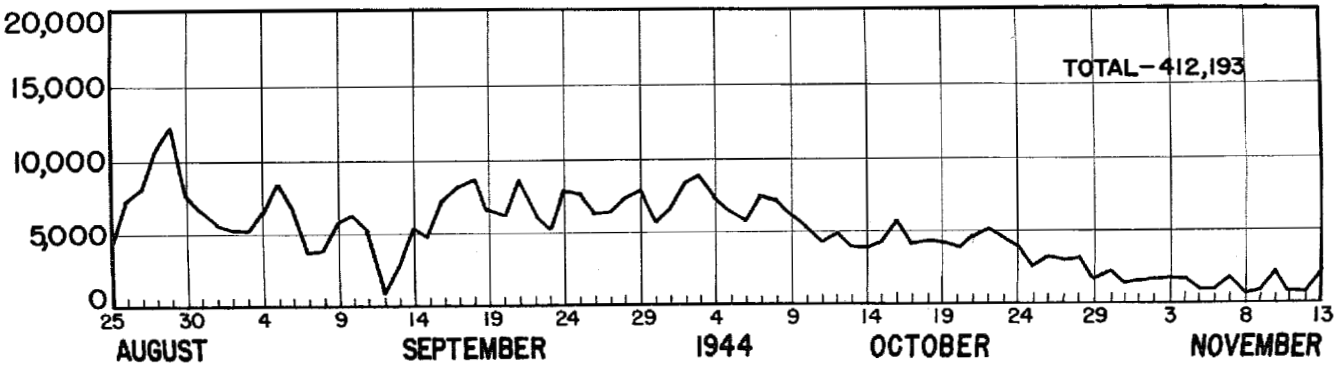
XYZ AND RED BALL MOTOR OPERATIONS

LONG TONS MOVED FORWARD DAILY BY M.T.S.

XYZ



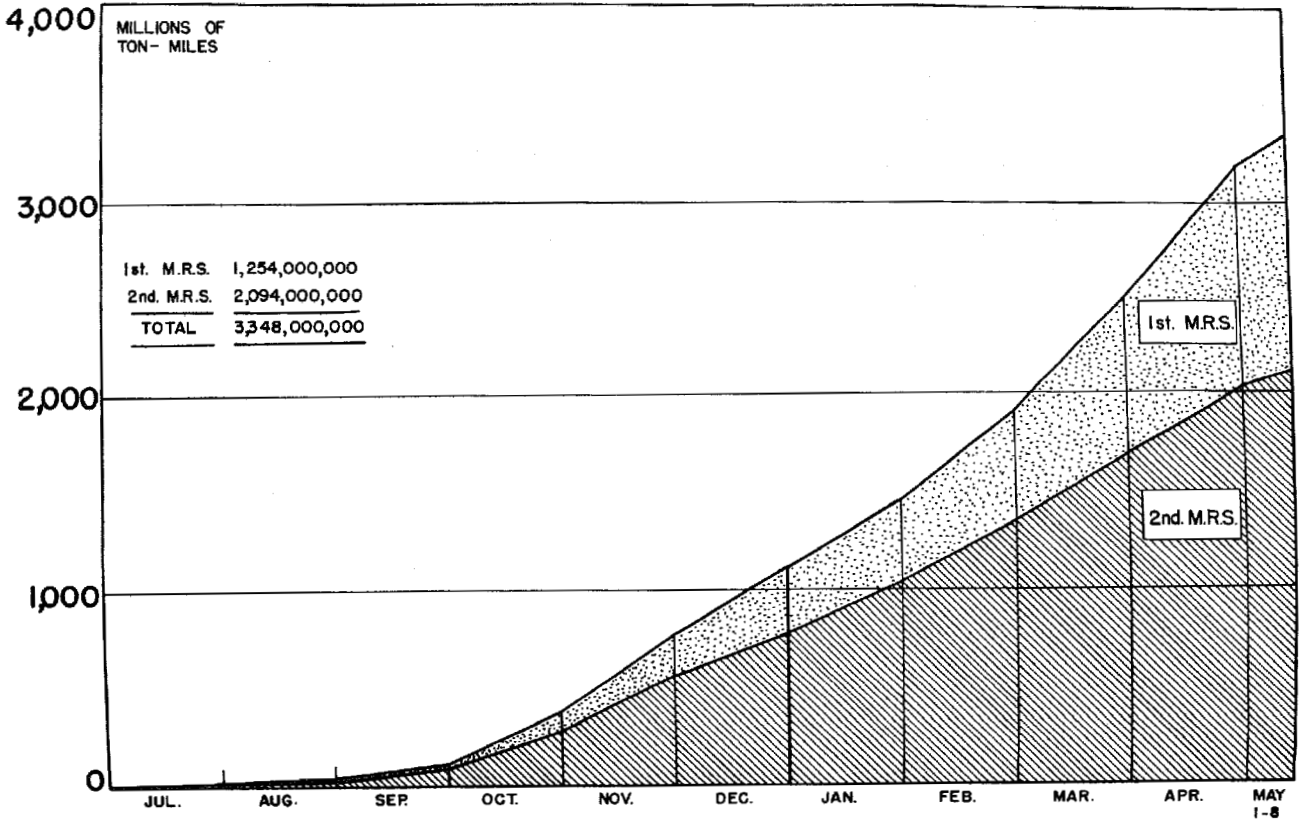
RED BALL



AGPO 12-45/300/2188 STATISTICS BRANCH T.C.

23

CUMULATIVE TON-MILES FORWARDED BY M.R.S.

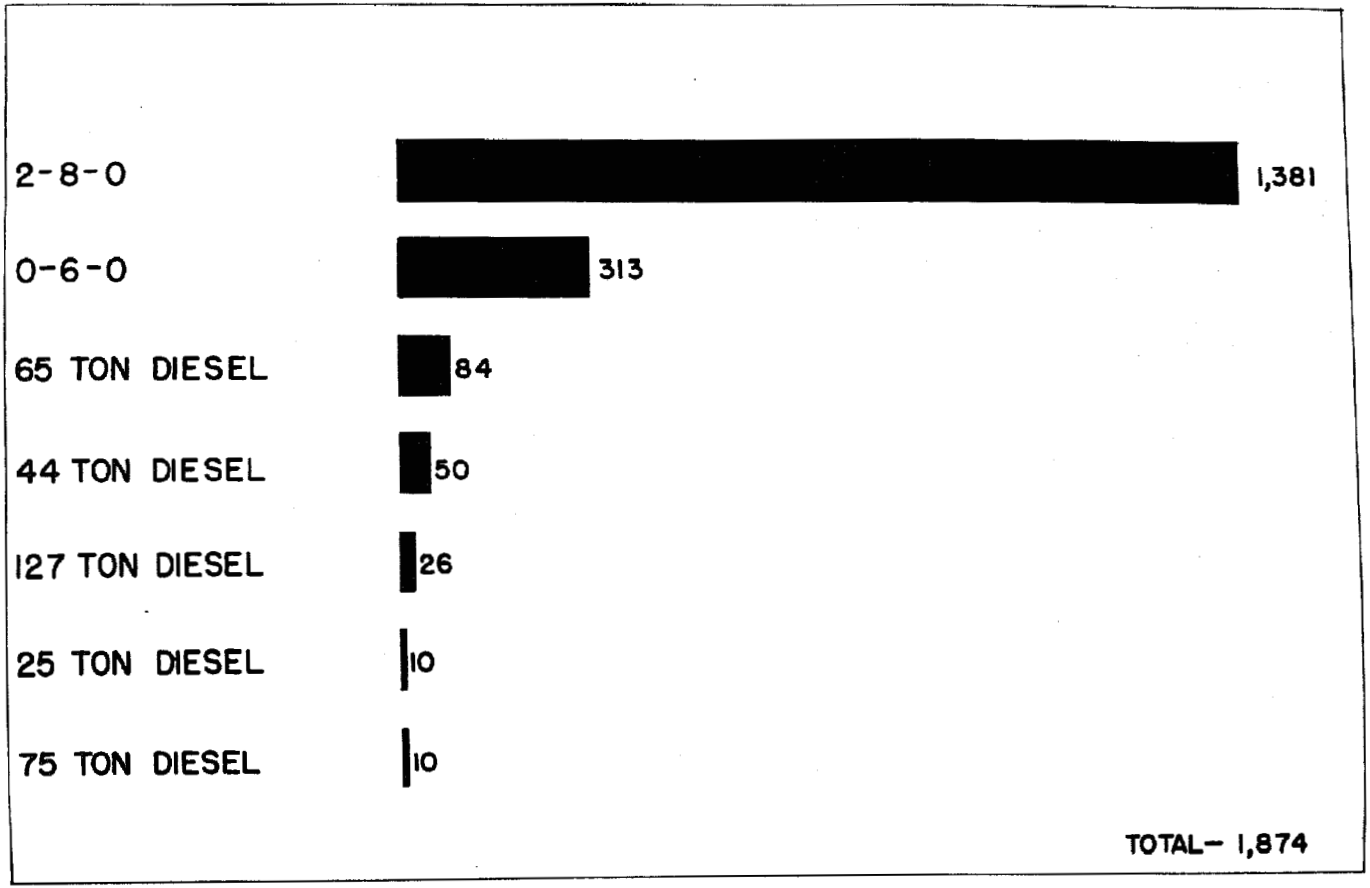


1944 - 1945

AMPS 32-43/500/12.86 STATISTICS BRANCH T.C.

APPENDIX 1

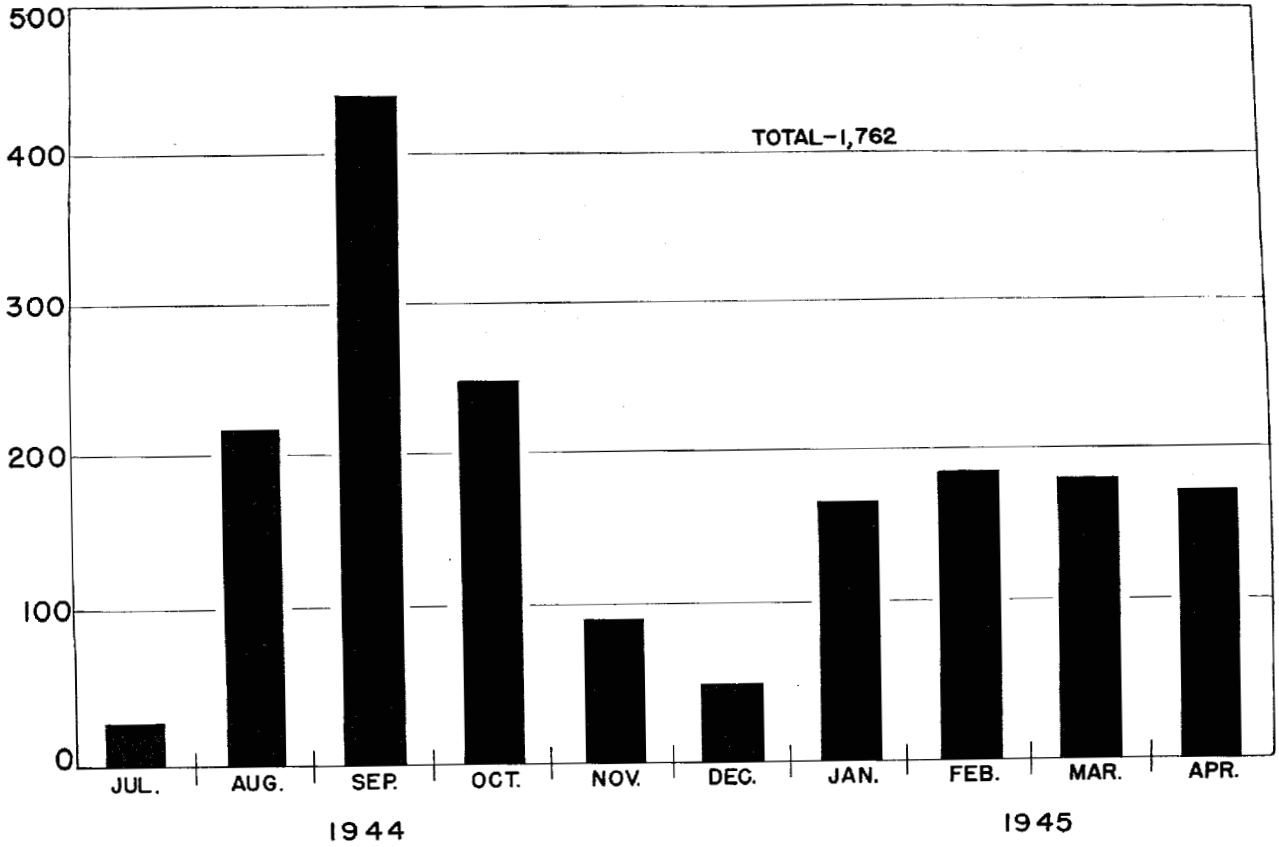
U. S. LOCOMOTIVES IN E.T.O.



ON HAND AS OF 8 MAY 1945

STATISTICS BRANCH T.C.

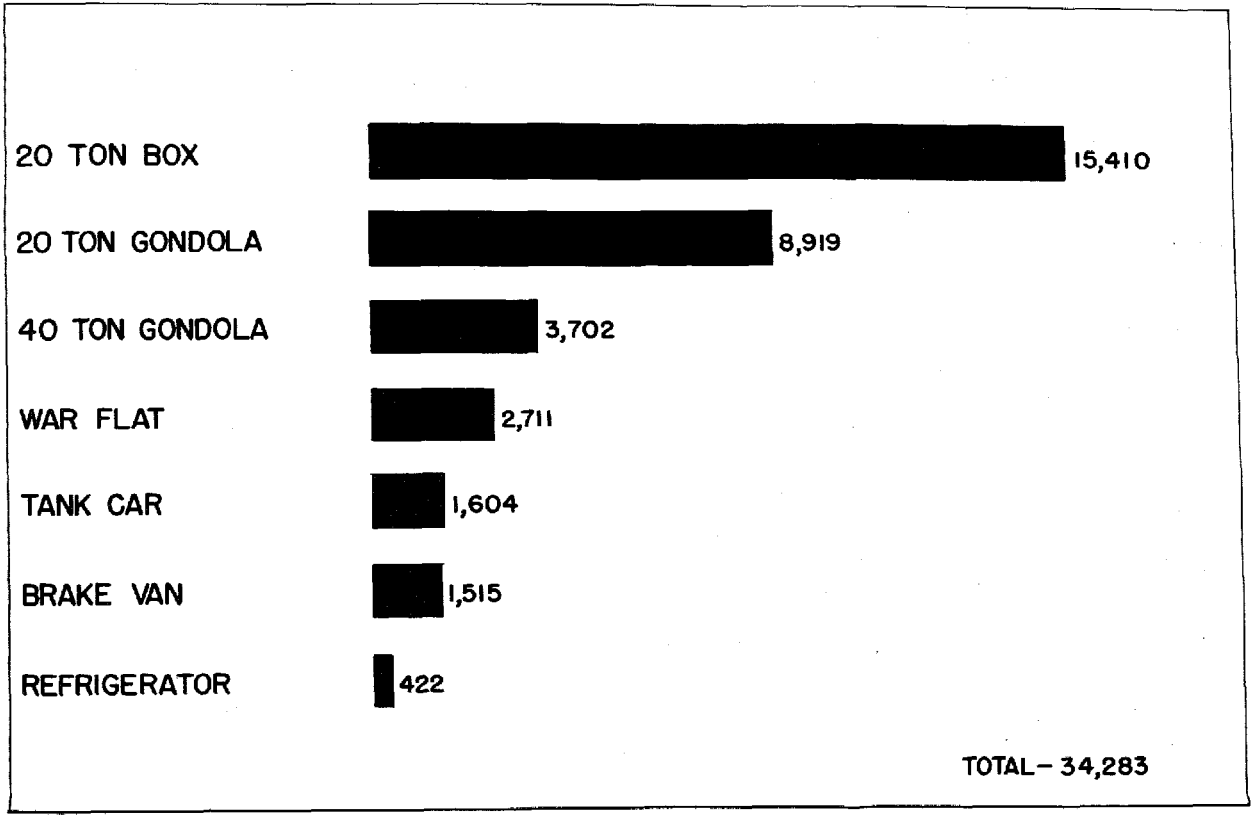
LOCOMOTIVE RECEIPTS ON CONTINENT



AGPD 12-45/399/21.88 STATISTICS BRANCH T. C.

APPENDIX I

U.S. RAILWAY CARS IN E.T.O.

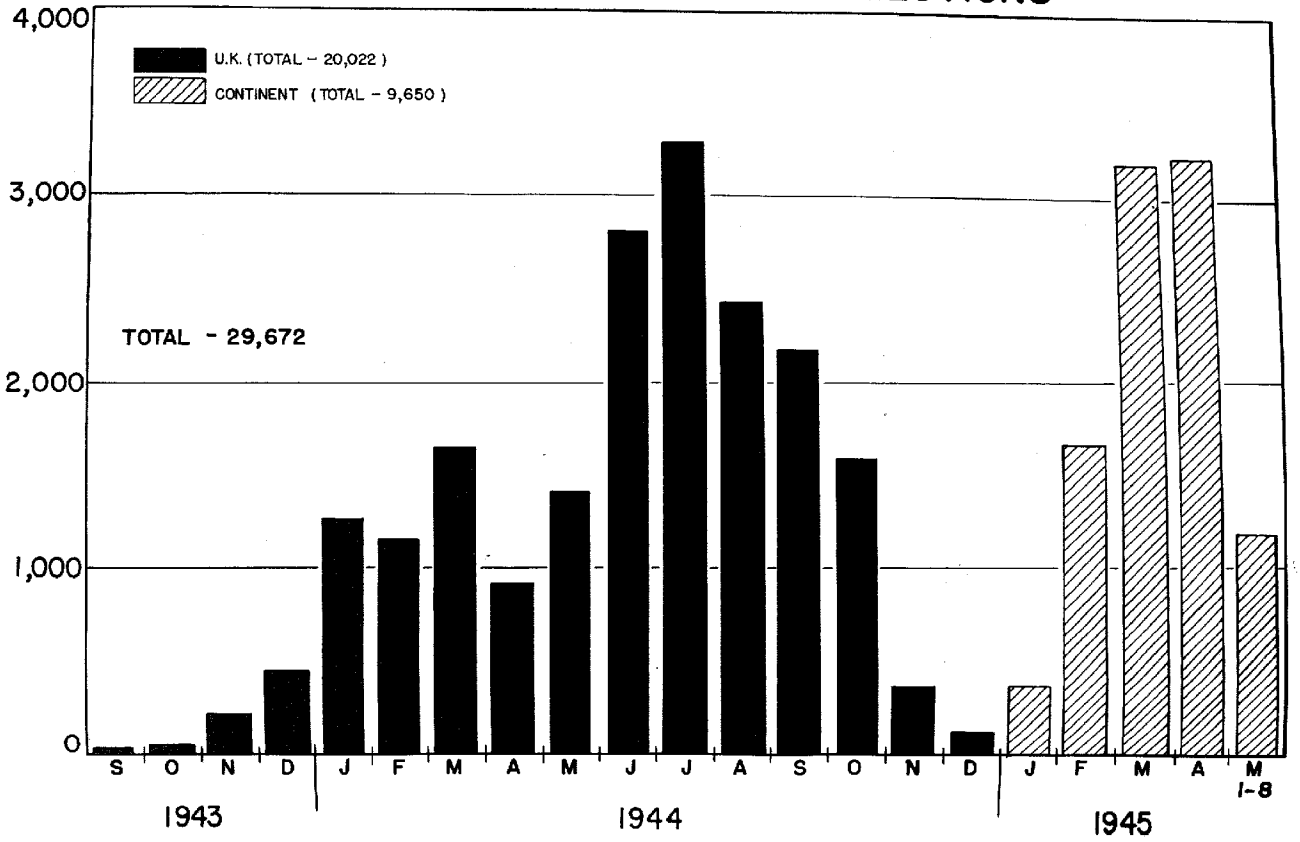


ON HAND AS OF 8 MAY 1945

AGPO 12-45/300/2188 STATISTICS BRANCH T.C.

APPENDIX 1

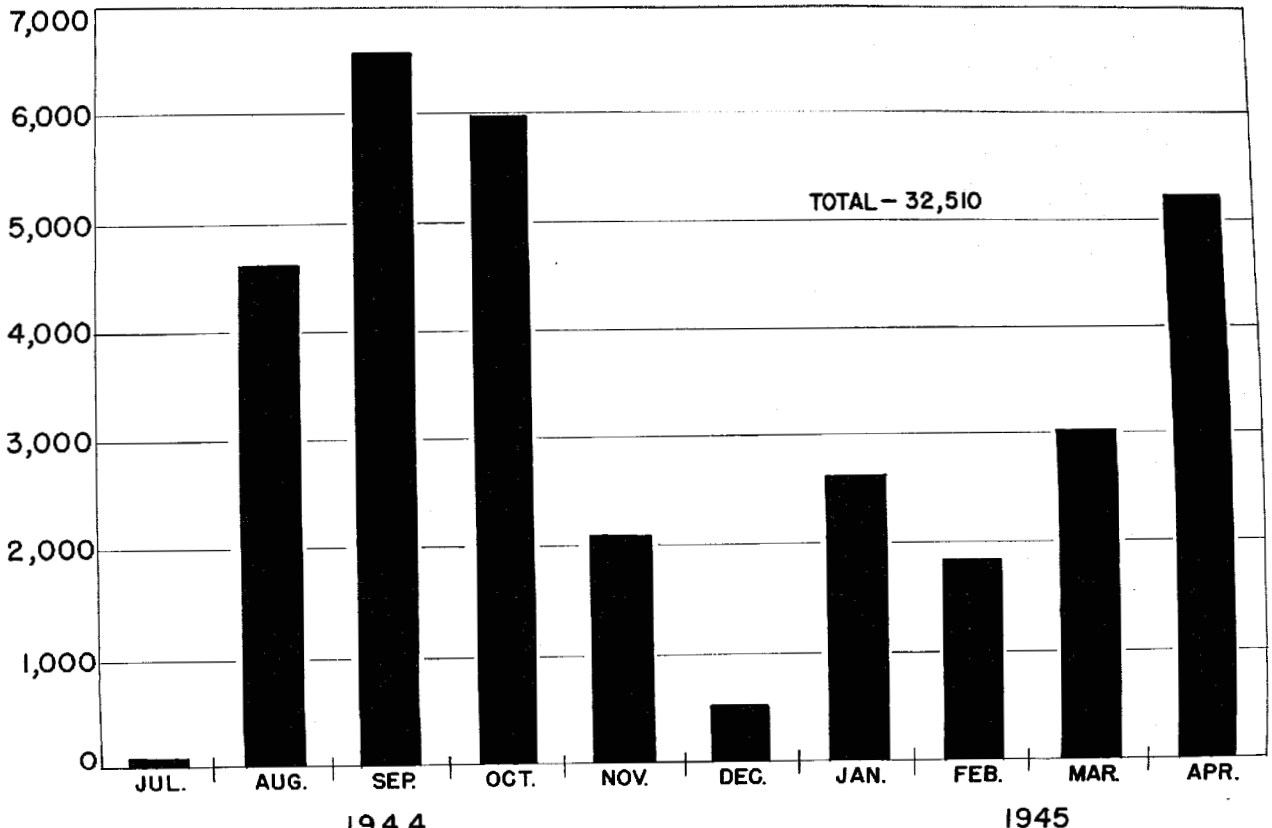
MONTHLY RAILWAY CAR ERECTIONS



STATISTICS BRANCH T.C.

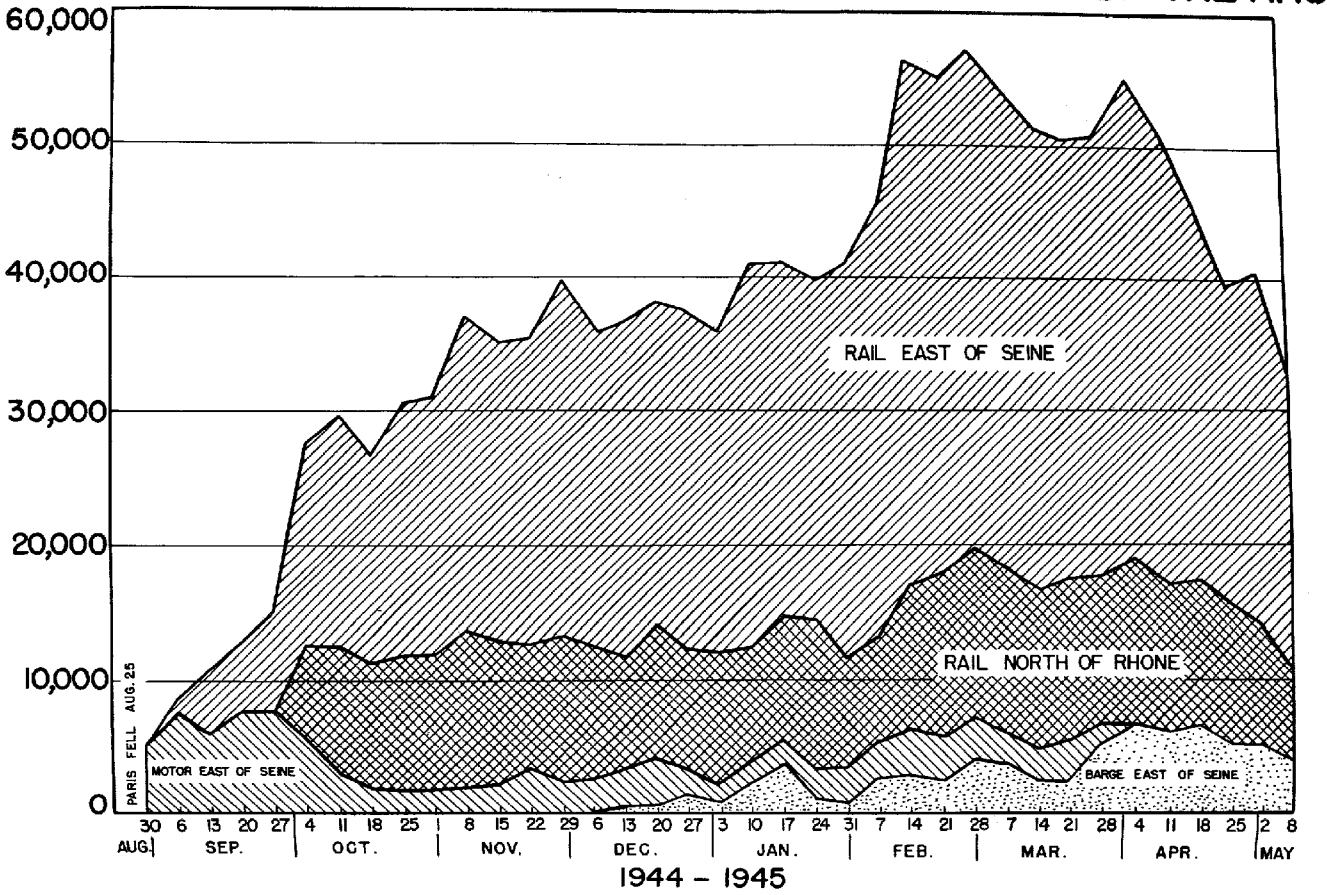
APPENDIX 1

RAILWAY CAR RECEIPTS ON CONTINENT



AGPO 32-45/300/2188 STATISTICS BRANCH T. C.

TONNAGE MOVED EAST OF THE SEINE AND NORTH OF THE RHONE

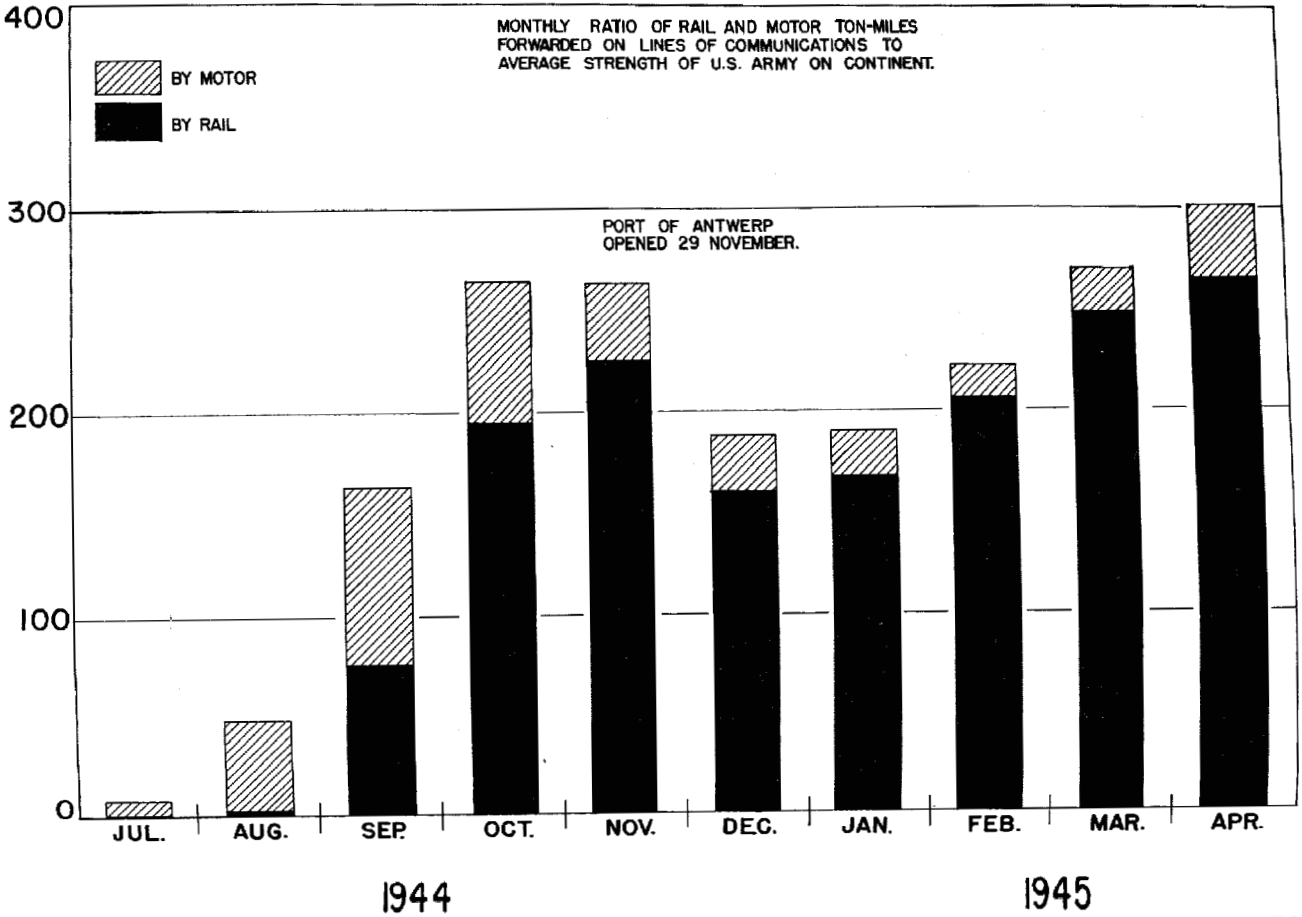


FIGURES PLOTTED ARE DAILY AVERAGES FOR THE WEEK ENDING ON DATE SHOWN

ABPD 12-45/300/2188 STATISTICS BRANCH T. C.

APPENDIX 1

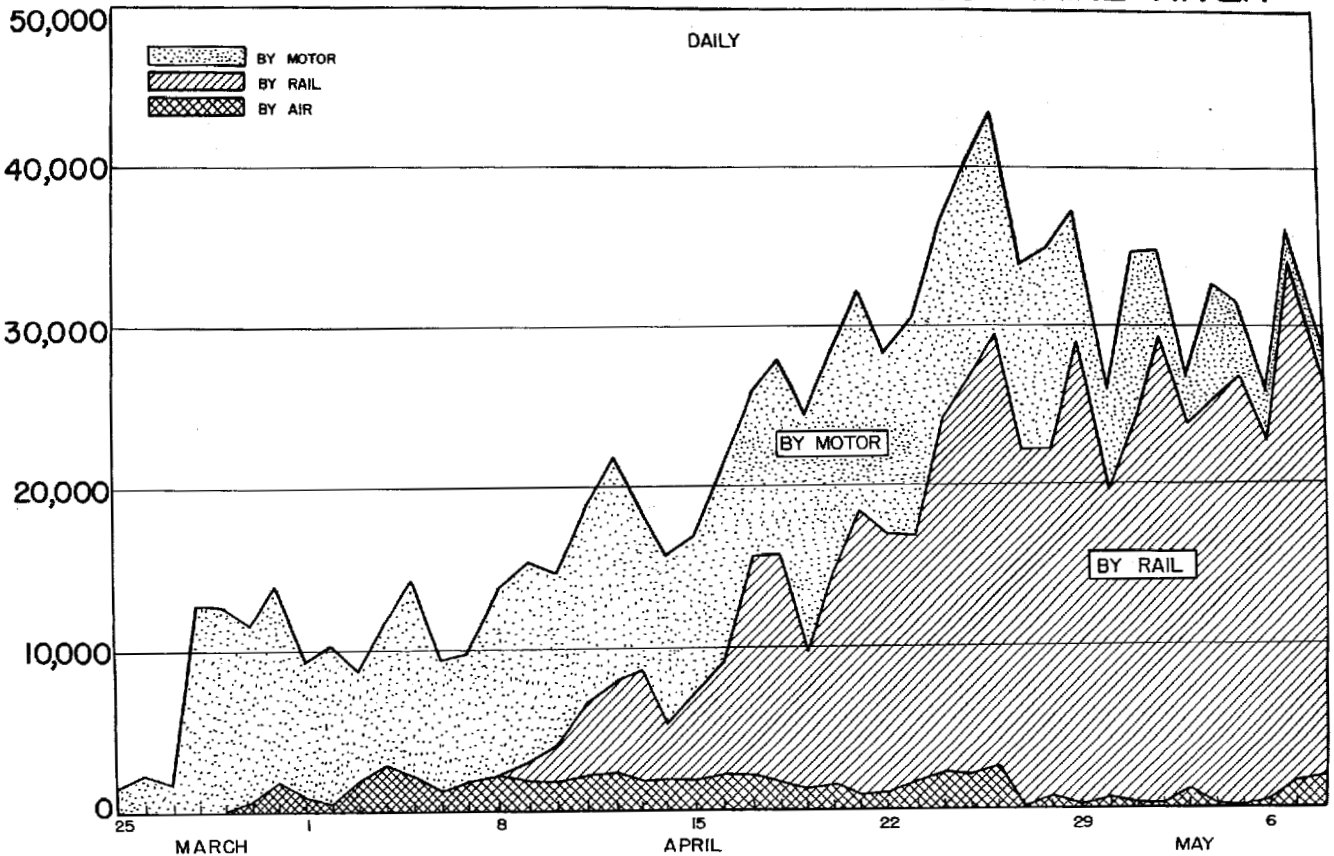
TON-MILES PER MAN PER MONTH



AGPD 12-45/300/2188 STATISTICS BRANCH T.C.

APPENDIX I

LONG TONS MOVED EASTWARD ACROSS RHINE RIVER



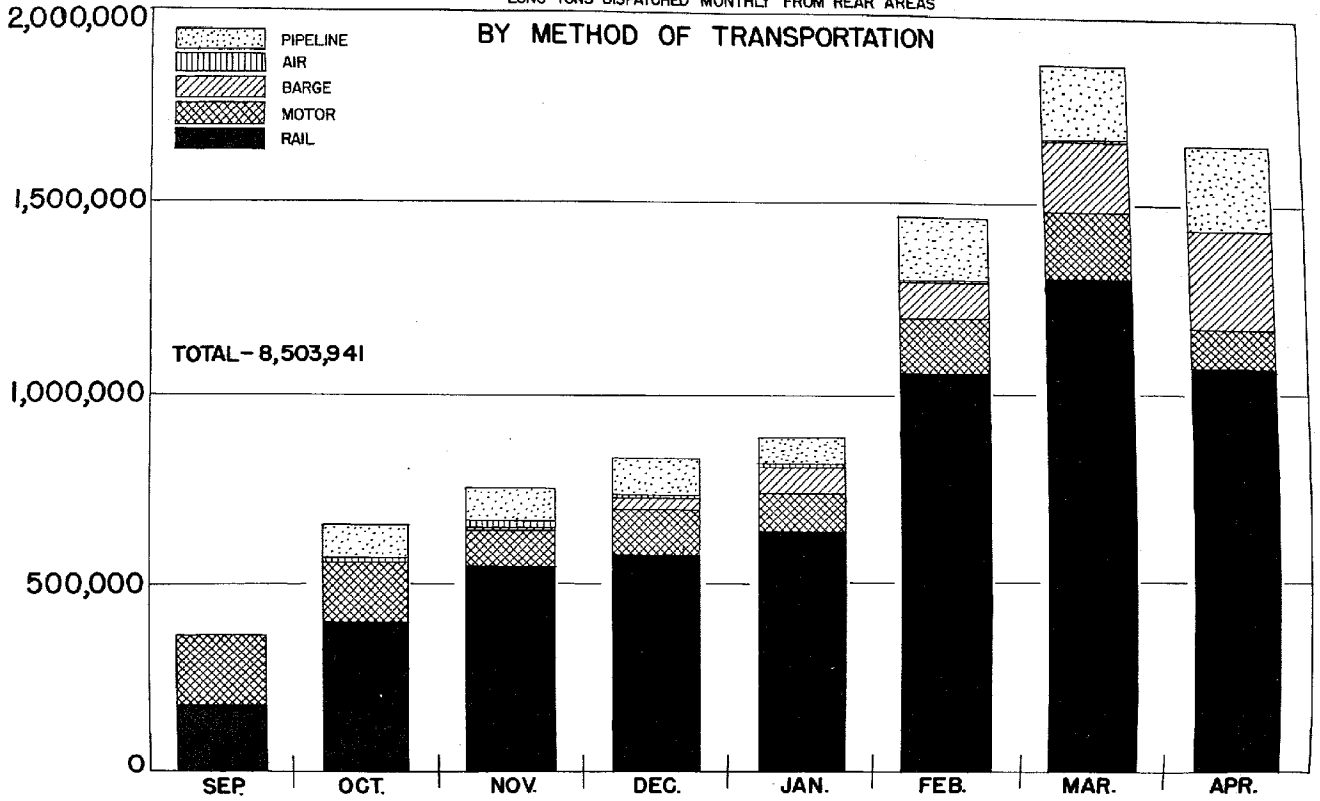
1945

AGPO 12-45/300/2188 STATISTICS BRANCH T.C.

APPENDIX I

COM Z SUPPLY MOVEMENTS

LONG TONS DISPATCHED MONTHLY FROM REAR AREAS



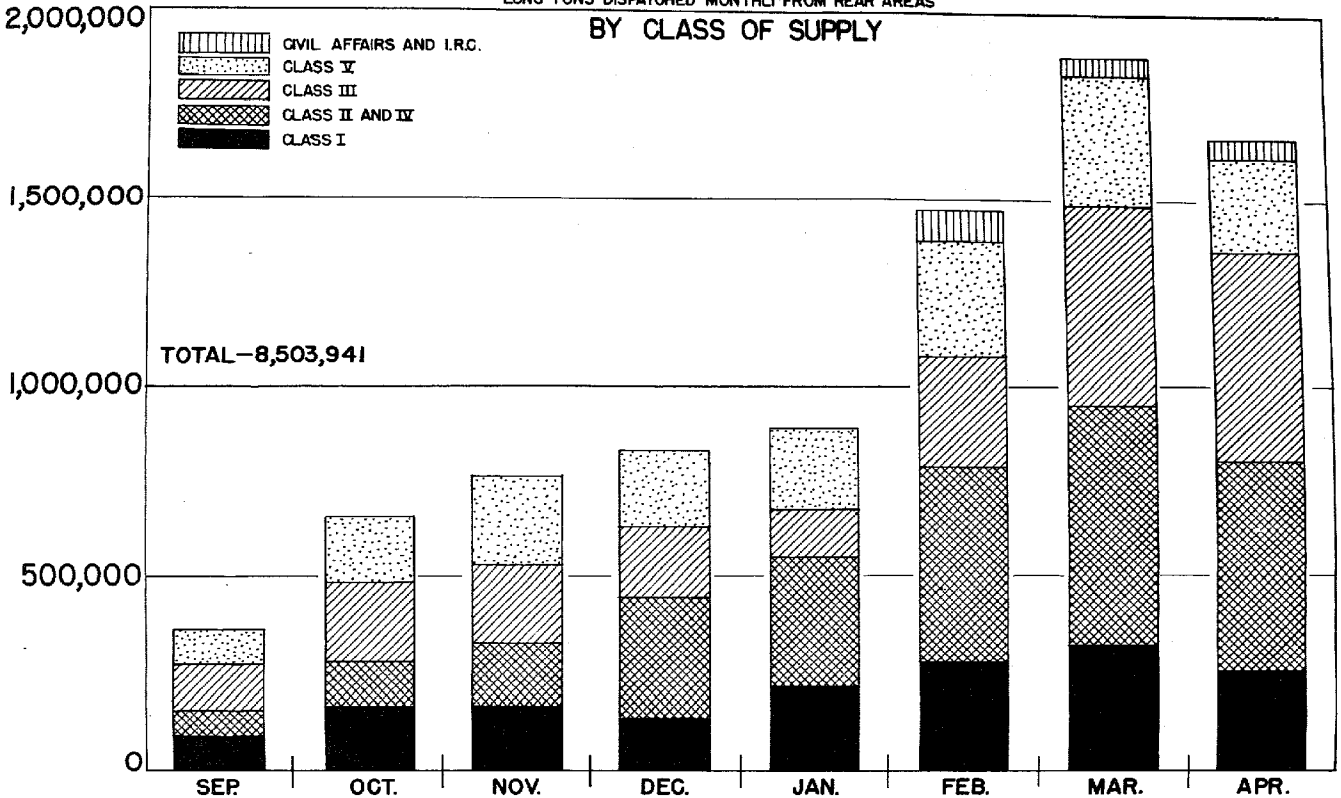
1944 - 1945

AGPO 12-45/500/2186 STATISTICS BRANCH T.C.

APPENDIX

COM Z SUPPLY MOVEMENTS

LONG TONS DISPATCHED MONTHLY FROM REAR AREAS



1944 - 1945

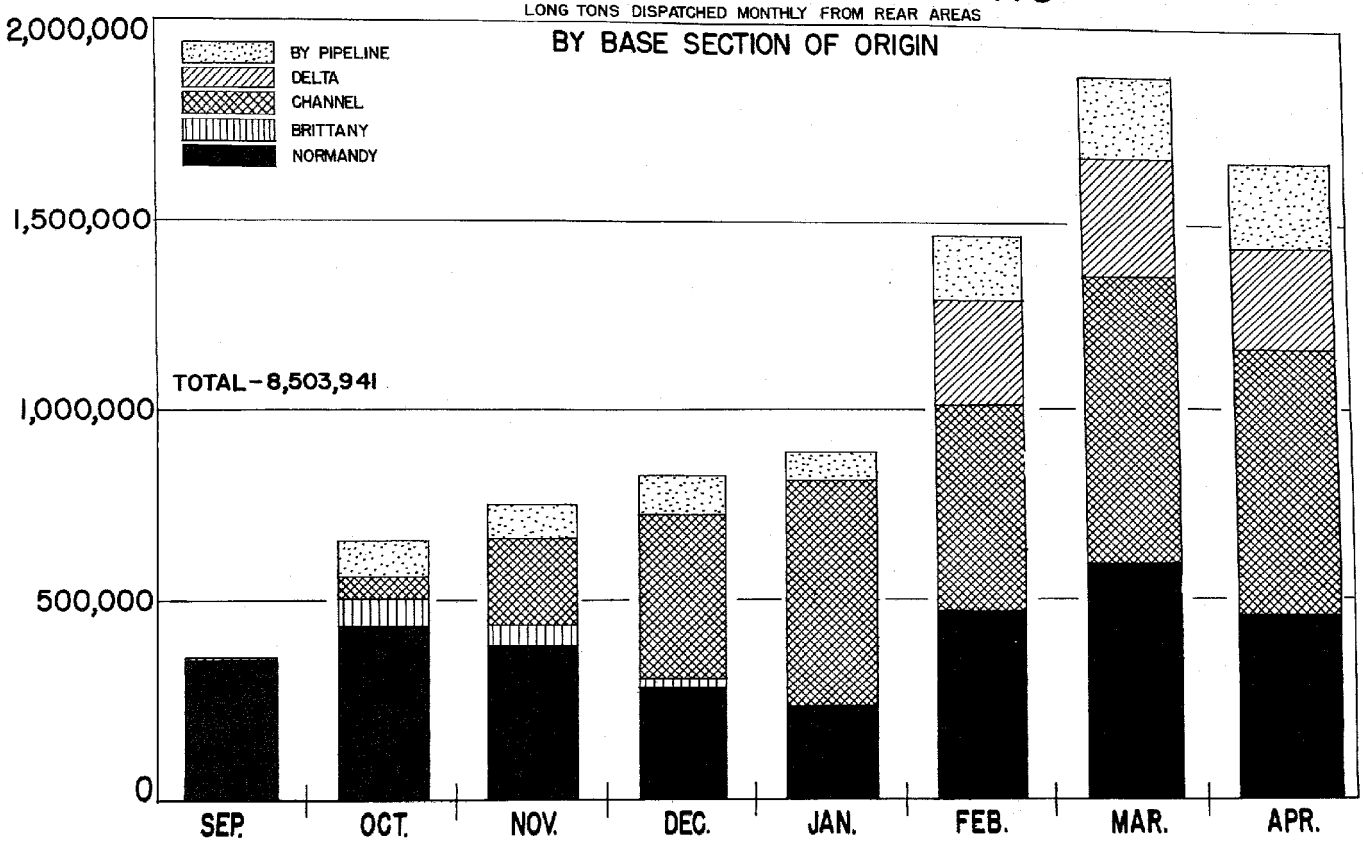
AGPO 12-45/300/2168 STATISTICS BRANCH T.C.

APPENDIX I

34

COM Z SUPPLY MOVEMENTS

LONG TONS DISPATCHED MONTHLY FROM REAR AREAS

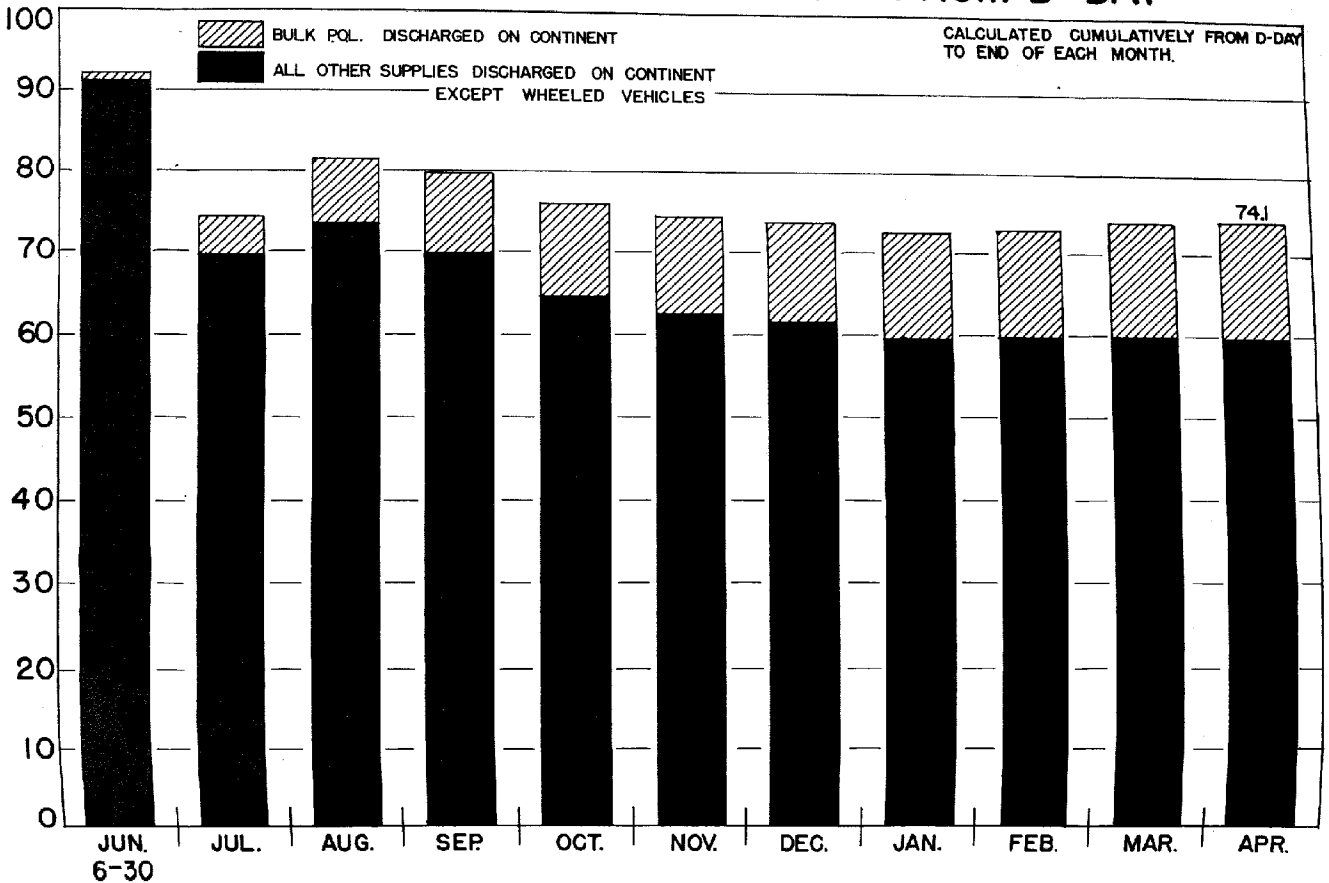


1944-1945

AGPO 12-45/300/2288 STATISTICS BRANCH T.C.

APPENDIX

POUNDS PER MAN PER DAY — FROM D-DAY

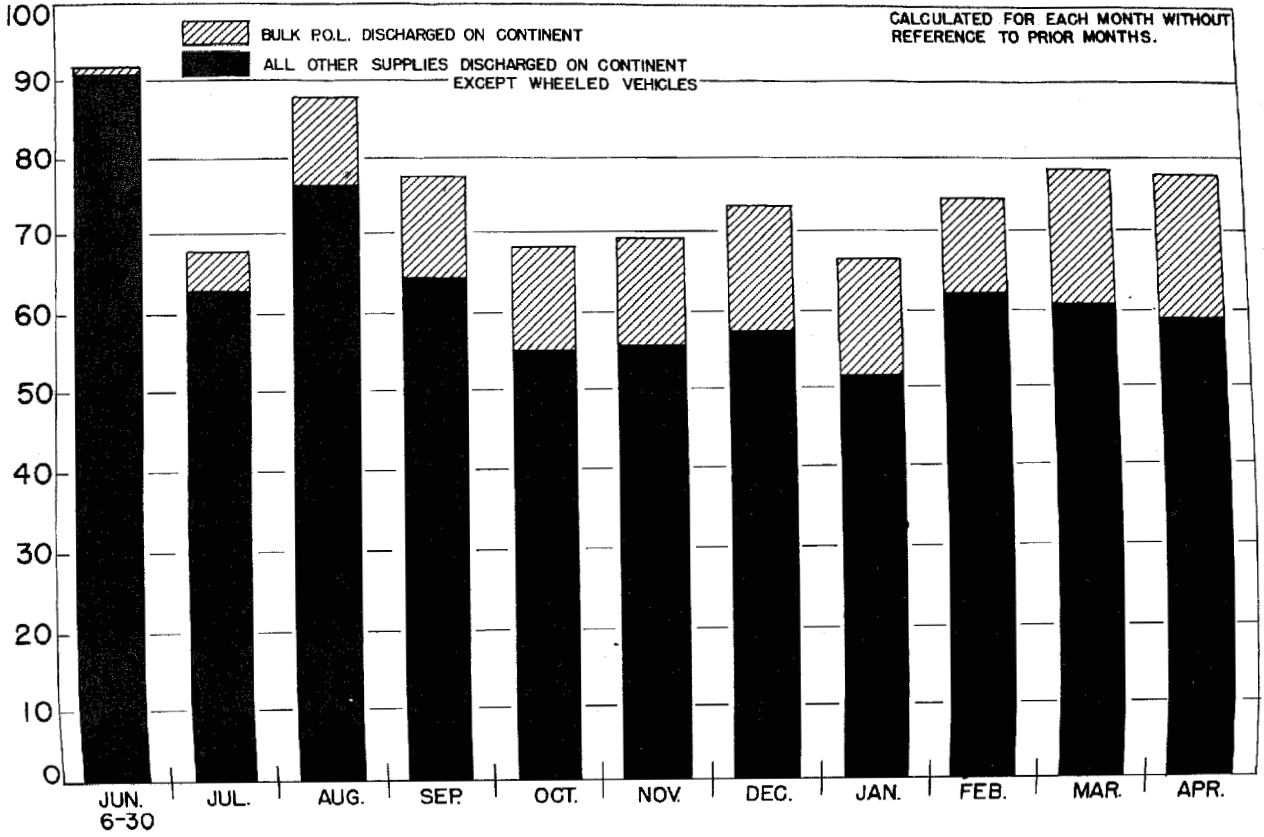


1944–1945

AGFD 12-45/300/21M STATISTICS BRANCH T. C.

APPENDIX

POUNDS PER MAN PER DAY — MONTHLY ONLY



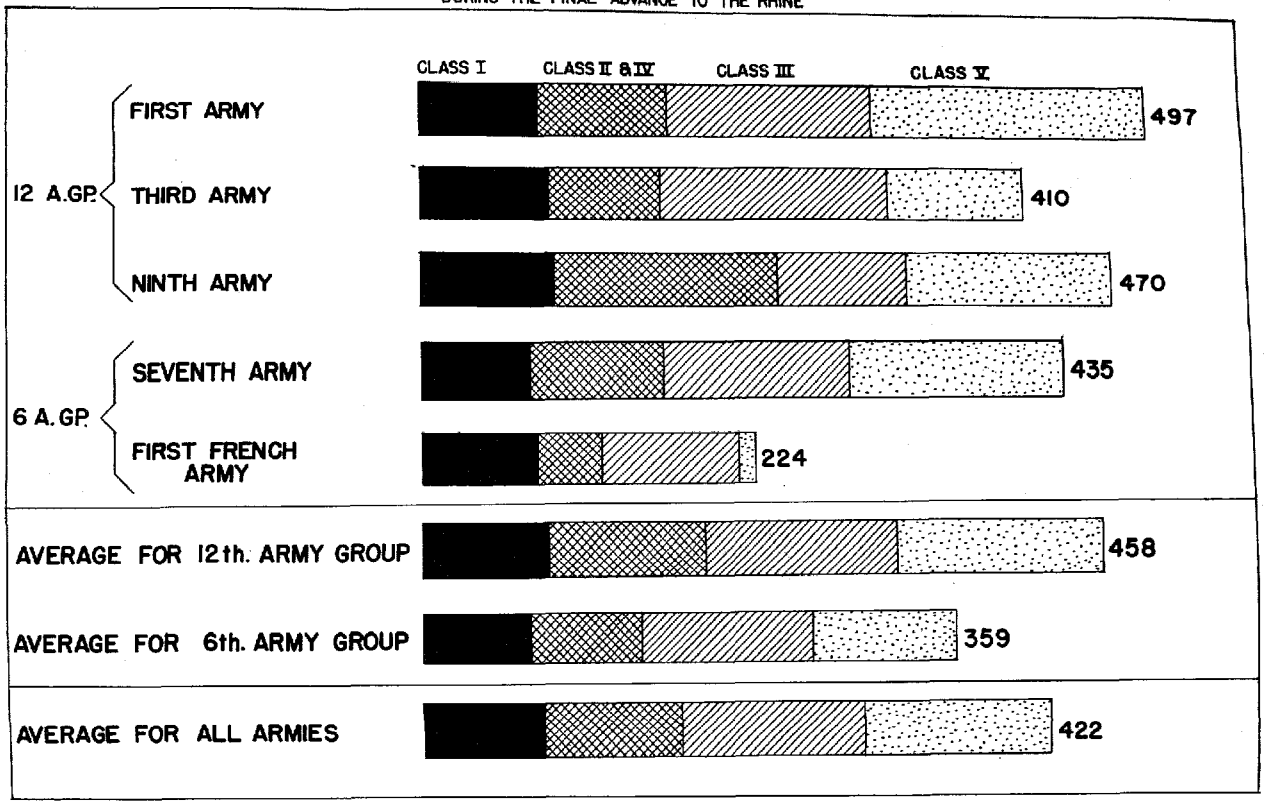
1944-1945

AGPD 12-45/300/2180 STATISTICS BRANCH T.C.

APPENDIX I

LONG TONS CONSUMED PER DIVISION PER DAY

DURING THE FINAL ADVANCE TO THE RHINE

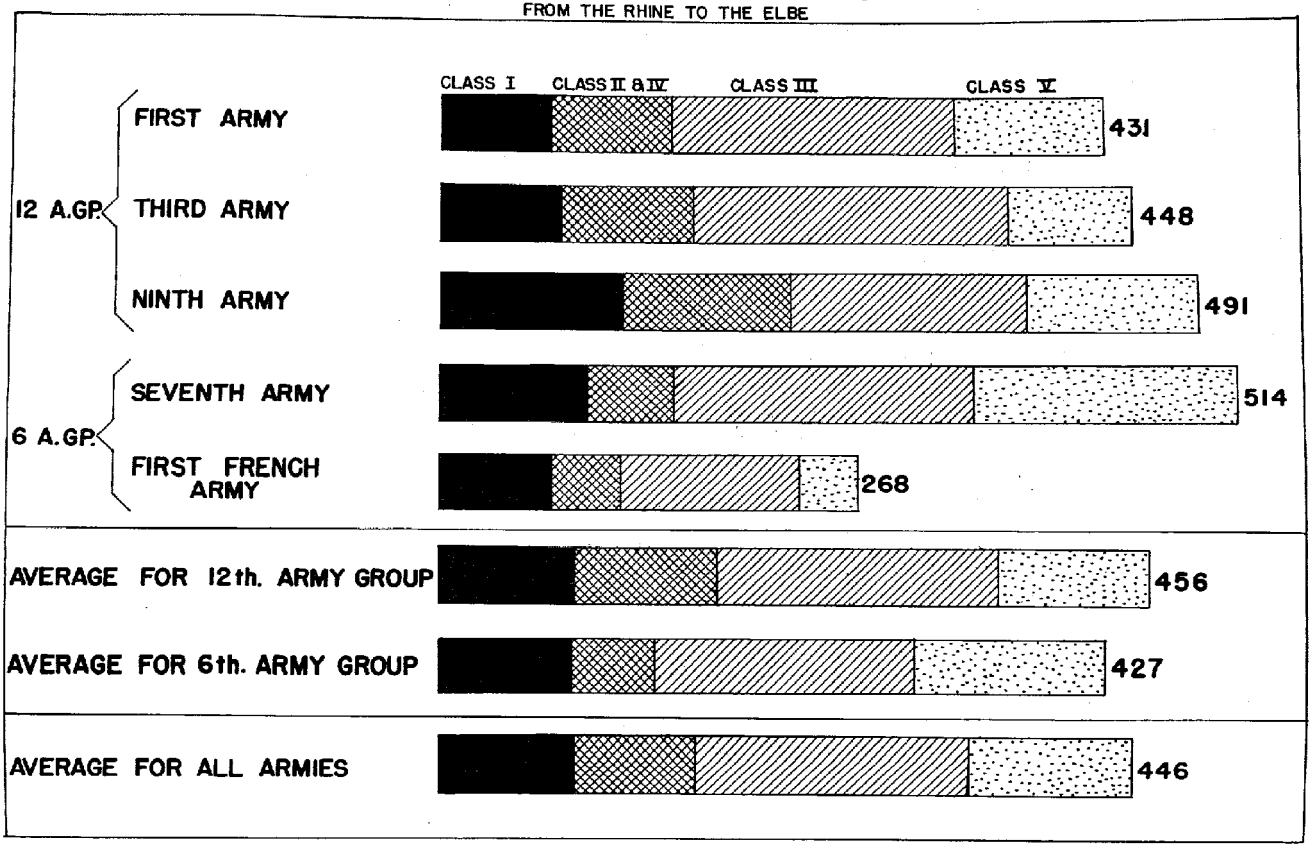


24 FEBRUARY TO 23 MARCH 1945

ASPO 12-45/300/2188 STATISTICS BRANCH T. C.

LONG TONS CONSUMED PER DIVISION PER DAY

FROM THE RHINE TO THE ELBE

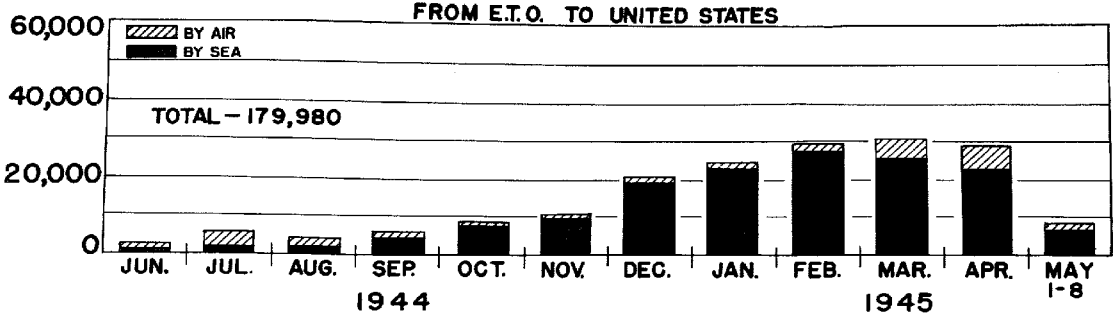


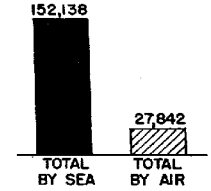
23 MARCH TO 25 APRIL 1945

STATISTICS BRANCH T.C.

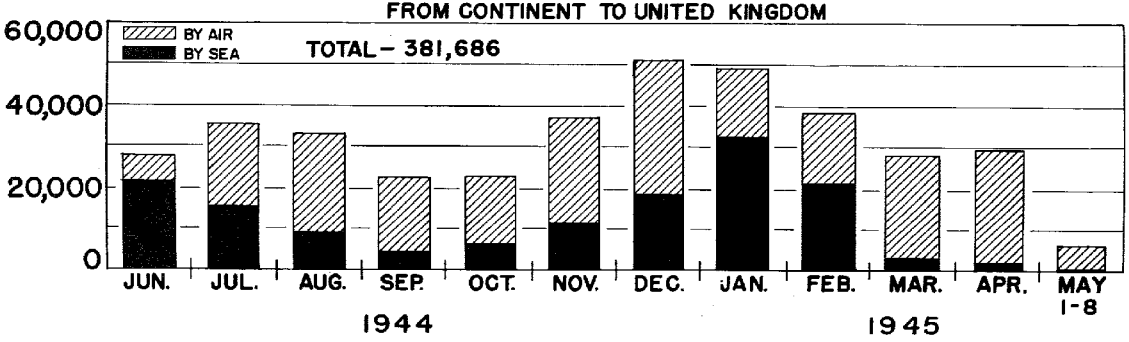
EVACUATION OF PATIENTS

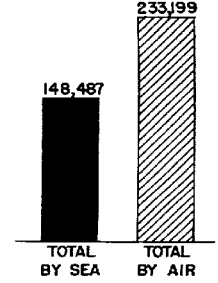
FROM E.T.O. TO UNITED STATES





FROM CONTINENT TO UNITED KINGDOM





APPENDIX I

ARPS 28-45/300/21M STATISTICS BRANCH T.C.