LOGISTICAL SUPPORT IN ATOMIC AND GUIDED MISSILE WARFARE

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8 Oct 1947


PURPOSE: To develop the type of logistical support required to support a type field army in an amphibious operation in atomic and guided missile warfare.

SCOPE: 1. Assume a type field army with the mission of making an amphibious invasion of a continental land mass.
   2. Analyze the problems of logistical support which arise from the use by both forces of atomic weapons and guided missiles.
   3. Consider the required dispersion in loading, and in the operations of beach establishments and other logistical facilities on the far shore.
   4. Determine and recommend the required changes in the present logistical organizations, doctrines, operational units, and techniques to furnish effective logistical support.
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DOWNGRADED AT 3 YEAR INTERVALS;
DECLASSIFIED AFTER 12 YrAns.
DOD DIR 5200.10
File No. L 8-11
Subject: Logistical Support in Atomic and Guided Missile Warfare.

1. PROBLEM.—To develop the type of logistical support required to support a type field army in atomic bomb and guided missile warfare.

2. DISCUSSION.
   a. Consideration of the targets against which the enemy will employ the atom bomb is paramount. In amphibious warfare the most profitable targets will be large concentrations of troops and supplies and concentration of shipping. To prevent this concentration a number of small ports must be developed and beach operations must be accepted as normal throughout the campaign. Development of large ports such as Brussels, Antwerp and Manila will not be desirable because of their vulnerability to the atom bomb.
   b. It can be expected that guided missiles will be employed as extremely long range artillery against concentrations of troops and large logistical installations. Present developments do not indicate the probability of employment of guided missiles with atomic warheads.
   c. Adequate protection for key headquarters must be provided throughout the campaign. This will require construction of underground shelters which are capable of withstanding blast and radiation produced by the atom bomb. All personnel must be provided with shelter having overhead cover which will offer protection from radiation and some protection from blast.
   d. To offer the least profitable targets to these weapons, logistical installations must be widely dispersed. This dispersion will require additional supporting troops of all services which in turn will require an adequate command and
control structure.

e. In order to provide the service troops in the proper numbers together with a well organized command structure a reinforced Logistical Division should be employed. This organization has the necessary flexibility to expand to meet the problem presented in paragraph 1.

3. ACTION RECOMMENDED.

a. That a reinforced Logistical Division be employed.

b. That the letter (Annex 8) to the Chief of Staff recommending employment of the Logistical Division be signed and forwarded.

Annexes: 1--Premise and assumptions.
2--Capabilities and Employment of the Atom Bomb.
3--Capabilities and Employment of Guided Missiles.
4--Analysis of Dispersion Required.
5--Construction of Protective Installations.
6--Analysis of Logistical Support.
7--Type of Logistical Organization Required.
8--Letter to the Chief of Staff.
9--Bibliography.

CONCURRENCES.

Director, O & T Division.
Director, P & O Division.
Chief, Service Group, Logistics Division.
Chief, Supply Group, Logistics Division.
Chief, Procurement Group, Logistics Division.
Chief, R & D Group, Logistics Division.
1. The period covered in this study will be from the initial assault until the establishment of a base section. It is estimated that this will cover the period from D-Day until D+30.

2. It is assumed that both Red and Blue forces are similarly equipped and can employ atomic bombs and guided missiles with equal effectiveness. It is also assumed that the Type Field Army will have organic guided missile organizations.

3. This study is based upon present developments in atomic bombs and guided missiles. No attempt will be made to estimate the capabilities of weapons which are undergoing tests, the evaluated results of which are not available.

4. It is assumed that there will be no major reorganization in combat units and that their total strengths will not change. The guided missile organizations will replace some units which are now organic to the Type Field Army.

5. The scope of this study insofar as atomic warfare is concerned will be limited to the employment of the atomic bomb. The aspects of other types of radiological warfare are considered too great to be included in this study.
ANNEX 2
CAPABILITIES AND EMPLOYMENT OF THE ATOMIC BOMB

1. Capabilities.

Chart 1 of Appendix A illustrates the damage which can be expected from the detonation of one atomic bomb. If employed against troops in an amphibious operation casualties due to collapse of buildings, fire, and flying debris would be somewhat less, but casualties due to radiation would be much greater due to lack of shielding afforded by buildings in cities.

As indicated in Appendix A it can be expected that all troops within 3,500 yards of ground zero will be either killed or injured. Two times this radius or 7,000 yards is the approximate frontage which an infantry division is normally assigned in an amphibious operation. By careful selection of the detonation point tremendous damage to troops as well as logistical installations would result. Not only would the bomb cause destruction but would also make the area untenable because of the radiation produced.

2. Employment.

Due to the tremendous effort and expense involved in producing an atomic bomb, targets will be selected with very great care at the highest strategic levels. It must be expected that the atomic bomb will be employed against large concentrations of troops and supplies as well as against other vital targets such as cities and manufacturing facilities. General Jacob Devers in an address to the student officers at the Command and General Staff College on 6 April 1948 stated: "The atomic bomb might be used on a beachhead such as OMAHA. It ordinarily will not be used against a field army." General Groves stated: "The type of military installation that the bomb would be used on would be, in my opinion, something such as a depot. A base such as Pearl Harbor is another example."

1 Gen. Jacob Devers Address to Student Officers C&GSC 6 April 1948
2 War Dept Letter, 5 Sept 1946 Subject: WD Policies for Protective Construction of Military Installations
A determined enemy can be expected to employ the atomic bomb against any target, the destruction of which would prevent an invasion of their homeland. Amphibious operations conducted in accordance with the doctrines developed during World War II would present profitable targets due to the concentration of troops and logistical installations.

Future amphibious operations must be conducted in such a manner as to present the least profitable target to atomic bombs. This can best be accomplished through proper dispersion of troops and logistical installations. Consideration must also be given to the construction of protective installations (Annex 5).
The notes presented here are a brief resume of the major effects of the four field detonations of atomic bombs which have taken place so far. They are intended to provide a ready reference for those facts only and are not a full description of the military effects.

**HIROSHIMA AND NAGASAKI**

Both of these bombs were burst in the air. Although the Nagasaki bomb was presumably more powerful than the Hiroshima bomb, the nature of the objective area was such that the effects were not too radically different.

The sequence of the effects was first, instantaneous intense heat and intense radioactivity of great penetrating power and second a blast similar to that in normal explosions, which is in reality composed of two parts, a shock wave coming after the flash followed by a blast wind or high air pressure lasting about one second.

Without attempting to indicate which of these effects causes each particular damage, certain minimum results are listed below. These results could be expected to apply generally to cities in the United States.

X is the point on the ground directly under the burst.

**PERSONNEL.**

- Up to 1,000 yards from X, about 88 percent of people were killed and the rest severely injured.
- From 1,000 to 2,000 yards, about 40 percent were killed with numerous severe injuries among the rest.
- From 2,000 to 3,000 yards there were many injuries with deaths running 3 to 5 percent.
- From 3,000 to 10,000 yards, injuries were mostly superficial.

**BUILDINGS.**

- Up to 1,000 yards from X, complete collapse or damage beyond repair.
- From 1,000 to 2,000 yards, approximately 90 percent damaged beyond repair.
- From 2,000 to 3,000 yards, very heavy damage—uninhabitable without extensive rebuilding.
- From 3,000 to 4,000 yards, damaged—uninhabitable without some repair.

**BRIDGES, RAILS, UTILITIES.**

Bridges close to X were destroyed or heavily damaged by shock and blast. There was little damage to roads or rail-road tracks. There was severe damage to overhead wiring over a wide area by blast wind, and to gas and water mains by shock.

Figure 8 illustrates graphically the approximate areas of the results described above under personnel and buildings.

In dispersed positions in the field, these effects probably would be greatly reduced, but it must be considered that future atomic bombs may be several times more powerful than the ones on which these figures are based.

In mountainous terrain, defilade would greatly lessen the effects from heat and atomic radiation and to a lesser degree from blast wind.

Higher bursts could be expected to decrease defilade protection, but forces and effects should be lessened because of the greater distance.

Under favorable conditions of wind, one airburst bomb over a spot might seriously contaminate with radioactive...
The Bikini Tests
The Air Burst—Test Able

Within half a mile of the burst lighter types of naval vessels such as transports, destroyers, and light carriers were sunk or damaged to such extent as to be unserviceable for combat. Heavy naval vessels such as battleships and cruisers suffered heavy superstructure damage and would have been out of action for extensive repairs which could be made only at a principle naval base.

Up to three-fourths of a mile there was damage in varying degree requiring extensive repairs in some cases. Numerous fires were started inside this distance.

Beyond three-fourths of a mile, there was relatively little damage.

Casualties from flash burns would have been high among personnel unsheltered from direct heat radiation.

Within the area of extensive blast damage to superstructures, personnel on shipboard would probably have been exposed to a lethal dose of radiation.

Underwater Burst—Test Baker
Figure 1. Approximate circles of effect on personnel and city buildings.
ANNEX 3
CAPABILITIES AND EMPLOYMENT OF GUIDED MISSILES

1. Capabilities.

The prototype of the guided missile is the German V-2 which, at the present time has better performance characteristics than United States developed guided missiles. This weapon has a range of 80 to 100 miles and carries a warhead weighing 2,000 pounds. The destructive capability of the missile can be compared to that of a large caliber naval shell. The warhead could contain atomic explosives but this is highly improbable due to technological difficulties, high cost of the atomic explosive, and the relative inaccuracy of the missile.

2. Employment.

Guided missiles are relatively easy to produce and it can be expected that large quantities would be employed by both sides. The guided missile is, in effect, extremely long range, high velocity artillery and will be employed as such.

Conventional antiaircraft weapons are practically useless against guided missiles due to their extremely high velocity of 3,600 miles per hour. Satisfactory counter-measures have not yet been developed. If enemy launching sites cannot be destroyed the best defense against this weapon is dispersal and protective shelter.
ANNEX 4

ANALYSIS OF DISPERSION REQUIRED FOR LOGISTICAL INSTALLATIONS

1. Beaches. During the period D Day to D±15 beach operations will be conducted in accordance with present doctrines. All supplies brought in during this period will come over the beaches. These supplies will be dispersed due to the nature of beach operations. During the period D±16 to D±30 when the ports begin to receive cargo, tonnage over the beaches will diminish slightly. Subsequent to D±30 the capacity of ports will increase and the tonnages over the beaches will diminish more. However, it is not visualized that ports will be able to handle all of the tonnage required to support the operation. Beach operations, therefore, will be continuous throughout the campaign and units must be provided which can handle the tonnages over the beaches during the entire operation.

2. Ports. Development of ports capable of handling over 3,000 tons per day is not desirable. The concentration of shipping in the harbor, the supplies in storage, and the large number of service troops in the area would present a profitable target to either guided missiles or an atomic bomb. It is recommended that a number of small ports no closer together than ten miles be developed, each capable of handling 1,000 to 3,000 tons per day. This will not require a concentration of more than 2 to 6 Liberty type ships at any one port.

3. Maintenance Areas. During the period D Day to D±30 a single army maintenance area will be developed. It is not believed that the maintenance area would be a profitable target for an atom bomb but would be an excellent target for guided missiles. Therefore, installations within the maintenance area should be widely dispersed.
ANNEX 5
CONSTRUCTION OF PROTECTIVE INSTALLATIONS

1. Type of Construction.

Protective installations to be fully effective must be underground and constructed of reinforced concrete. Other protective installations not as effective can be partially underground and constructed of reinforced concrete or sandbags. It is not recommended that protective installations be constructed which will give full protection at ground zero. This type of construction would require many feet of reinforced concrete on the top and several feet for the sides. The effort in manpower and the amount of material would not warrant this type construction during the phase covered in this study.

All individuals and all headquarters should construct shelters which have overhead cover of earth or concrete. This will afford protection against radiation and some protection against blast and fragmentation.

2. Types of Installations Requiring Protective Installation.

Communication centers and vital operations and planning headquarters will require protective housing. The construction effort for the army war room should receive the highest priority. Next in priority should be the army, corps, division, and lower headquarters' communication centers.
ANNEX 6

ANALYSIS OF LOGISTICAL SUPPORT REQUIRED UNDER THE CONDITIONS STATED
AND WITHIN THE PREMISE AND ASSUMPTIONS

1. Supply.
   a. Requirements

   (1) Accompanying supplies
   The following quantities of accompanying supplies are recommended:
   
<table>
<thead>
<tr>
<th>Class</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classes I, II, IV (less construction materials)</td>
<td>30 D/S</td>
</tr>
<tr>
<td>Class III</td>
<td>15 D/S</td>
</tr>
<tr>
<td>Class V (combat troops)</td>
<td>5 U/F</td>
</tr>
<tr>
<td>Class V (service troops)</td>
<td>3 U/F</td>
</tr>
</tbody>
</table>

   Sufficient class IV construction materials including equipment for initiation of construction of protective shelters, airfields, bulk petroleum installations, signal communication facilities, should accompany assault echelons in naval amphibious shipping, or, where necessary, in special loaded heavy shipping direct from the United States.

   (2) Resupply. Resupply should be direct from the United States and should be accomplished by AUTOMATIC SUPPLY made possible by the employment of preloaded resupply ships as follows:
   
   (a) Maintenance for the first 30 days to be provided by standard balanced classes I, II, III, and IV ships each based on approximately 30 D/S for 25,000 troops.
   
   (b) Additional Class II and IV supplies based on estimated combat losses to be provided in special loaded ships.

   (c) Class IV construction materials to be provided as follows:

   Sufficient ships to provide minimum basic facilities in each principal landing area to be loaded for selective discharge. Thereafter ships are bulk loaded.
(d) Resupply vessels should be scheduled to arrive in the objective area beaches or at ports based on the capacity of the beach or port organizations to discharge and in sufficient numbers to meet the daily requirements for supplies of all classes. Partial discharge of ships to meet operational demands should be permitted during the first 30 days of the operation.

(3) Storage. Large storage installations such as general depots will not be feasible. Small branch depots widely dispersed should be provided to handle all storage. While existing storage facilities will be used to the maximum, construction of hardstands and covered storage will be necessary.

2. Evacuation and Hospitalization.

a. Evacuation. During the assault phase evacuation will be by naval shipping. Evacuation of radiological casualties should be accomplished in accordance with predetermined priorities. Evacuation policy during the period D-Day to D+30 should be immediate.

b. Types of Medical Units.

In addition to the medical units presently organic to the Logistical Division medical personnel trained in radiological safety are required. These will be units having specialized training in radiology and the care of radiological casualties. They will be equipped with instruments capable of measuring radioactivity.

c. Radiological Safety.

All personnel should receive training in radiological safety prior to the operation. Each squad leader or similar unit commander should be provided with radioactive measurement devices to determine the rate at which radiation is absorbed and the area exposed. Radiological safety officers should be assigned to units of battalion size. Each one should be provided with a small staff of highly trained technicians.

3. Transportation.

a. Water. It is not contemplated that coastwise shipping and inland
waterways will play a significant part in transportation.
b. Rail. It is not contemplated that rail transportation will handle large tonnages as in the past due to the vulnerability of marshalling yards, bridges, and rolling equipment to guided missiles. However, existing facilities should be repaired and used. No new or time consuming construction should be initiated.
c. Highway. It can be expected that the construction effort made on road construction will be much greater than in the past. Supply installations will be widely dispersed and access and connecting roads must be constructed and maintained. The major portion of tonnage handled will be by truck.
d. Pipe. Maximum effort should be made to employ pipelines to transport fuel as far forward as divisions. Tank farms should be widely dispersed and storage tank capacity should be limited to 1,000 barrels each storage tank.
e. Air. During the period D-Day to D+30 air supply will be employed only in cases of emergency.

4. Service.

a. Maintenance. Due to dispersion in the maintenance area additional service units will be required.

b. Utilities, Camouflage, Fire Fighting. Additional engineer units will be required to provide camouflage for protective installations. Fire fighting units should be provided for all units of battalion size.
TYPE OF LOGISTICAL ORGANIZATION REQUIRED TO SUPPORT THE OPERATION

1. Two different organizations which could support the operation are considered below:

   a. An ASCOM organization could be activated and provided with the necessary troop units and headquarters. An organization of this type is provisional in nature and does not have the flexibility desired.

   b. A Logistical Division augmented with the necessary service units would provide the desired command structure as well as the flexibility required to meet changing situations. The composition of the Logistical Division is such that service units can be added or withdrawn as the situation dictates.

2. It is recommended that the Logistical Division, augmented with additional service units be employed to provide logistical support to the Type Field Army.
Subject: Logistical Support in Atomic and Guided Missile Warfare.

To: Chief of Staff
   Department of the Army
   Washington, D.C.

1. Recommend that a reinforced Logistical Division be employed to provide logistical support to a type field army engaged in amphibious operations under guided missile and atom bomb conditions.

2. Under the conditions stated above all logistical installations will be more dispersed than they were during past wars. Construction of protective shelters will be required for key headquarters to provide protection from guided missiles and atom bombs; ports will be smaller and more numerous; supply over beaches will continue throughout the operation.

3. The dispersion and construction necessary will require larger numbers of service troops than were required in similar operations in the past. By reinforcing a logistical division with the required numbers of service units adequate logistical support can be provided. This organization will provide the necessary command structure and is flexible enough to be able to absorb and employ the additional units.

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Lieutenant General
Director, Logistics Division
ANNEX 9

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