THE ROLE OF INTERMODALISM IN FUTURE MILITARY MOBILIZATIONS

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As today's military planners look to the future, they should first examine the past. During the Cold War, the United States positioned massive amounts of military equipment in huge warehouses located throughout Europe. Our strategy was to airlift troops, if necessary, to the potential theater of operation. Once there, these forces were expected to move to the warehouses, get their equipment, and proceed directly to battle positions.

Today, we no longer maintain massive forces in forward deployment positions. Since the fall of the Berlin Wall, the U.S. Army in Europe deactivated three combat divisions, a war fighting corps, and more than 341 nondivisional units. Troop withdrawals have totaled more than 145 battalions since 1990. Total European troop strength, which was 311,000 in fiscal year 1990, will be reduced to about 100,000 by the end of fiscal year 1995.

Along with troop reductions, we have redistributed or returned to the United States thousands of military vehicles and thousands of tons of supplies and ammunition. We have reduced the number of European war reserve warehouses from 19 to 5.

Our strategy has changed. Where we formerly relied on a global strategy of forward deployment, today we have a new global strategy that relies on power projection. The troops must still move by airlift in response to future contingencies, but a significantly larger portion of their equipment must deploy from U.S.-based installations.

HOW DO WE RESPOND TO FUTURE CONTINGENCIES?

Power Projection

As a result of the changes in Europe at about the time of Operation Desert Storm, Congress mandated that the U.S. Department of Defense (DOD) assess its mobility needs to ensure our nation's capability to meet deployment requirements for future contingencies. From this was born the Mobility Requirements Study (MRS). The assessment is ongoing; DOD is currently updating MRS with what is known as the MRS Bottom Up Review, Update.

DOD, the Joint Chiefs of Staff, and the armed forces identified future power-projection needs. Air and naval forces are largely self-deploying. They own and operate their own organic means of deployment as well as use commercial strategic air- and sea-lift services. Their arrival in a theater of operations principally depends on how long it takes to fly or sail from base locations. Whereas the Marine Corps' most rapid response forces rely on naval amphibious shipping, other Marine Corps organizations, including the Assault Follow-On Echelon, and the Army must rely on some form of limited military strategic lift, supplemented by commercial services to reach conflict zones.

This raises other pertinent questions. If moving to a seaport, what mode of transport is required? Will forces and equipment move by rail, motor convoy, or a combination of both? Can the unit load at the home installation, or must it move to some intermediate location first? Does the sealift DOD plans to use for force deployment encourage the use of supplemental containers to move equipment? If so, how much? Does the home station have an on-site intermodal facility? Can forces load containers at home stations, or must they move them to a nearby facility?

HOW LARGE A FORCE?

To answer these and other questions, we must first determine what the deployment requirement is. For the purposes of this paper, we will assume the primary requirement is to mobilize and move the Army's contingency corps. The Army has identified a contingency combat corps made up of five and one-third combat divisions and sufficient combat support units as the initial response to meet future defense needs. The contingency corps will be followed by other forces as required. The corps' combat units include an airborne division, an air assault division, and three heavy mechanized infantry or armor divisions. There also is an armored cavalry regiment assigned to the corps. To support the time lines imposed by MRS, the Army must have enough surge sealift and airlift capability to deploy as many as three of these Army divisions anywhere in the world in 30 days.

The first two of the heavy divisions, defined as heavy because of the large number of main battle tanks and other tracked fighting vehicles assigned, have 2 days (East Coast) and 4 days (West or Gulf Coasts) to

TABLE 1 APPROXIMATE SIZE AND OTHER CHARACTERISTICS OF THE COMBAT DIVISIONS AND REGIMENTS

Type Unit	Total Square Feet	Total Short Tons	Measurement Tons
Division			
Air Assault	1,034,669	35,889	175,682
Airborne	733,750	24,144	110,691
Armored	1,538,468	108,708	302,263
Mechanized	1,543,868	107,777	303,342
Regiment			
Armored Cavalry	439,231	32,976	87,047

mobilize and move their lead brigades to seaports for deployment. Once the divisions arrive at the ports, the first ships must load and sail within 2 days. Each brigade requires as many as three large ships for deployment. Because each division has three brigades, as many as nine ships per port must be loaded within 6 days. The idea is to load three cycles of vessels.

THE MOBILIZATION CHALLENGE: HOW DO WE GET THE DIVISIONS TO THE PORTS?

What exactly is the task at hand? How large of a force is a corps? The air assault, airborne, and armored divisions could represent more than 40,000 soldiers, most of whom will deploy by air, and as much as 3.8 million feet of unit equipment and supplies. The table above shows the approximate size and other characteristics of the combat divisions and regiments that make up the contingency corps in this scenario. In this table, 1 short ton is equal to 2,000 lb, and 1 measurement ton is equal to 40 ft^3.

Depending on the home station, type of unit, and seaport of embarkation, a division could require as many as 2,700 railcars to deploy. Some of the units are close enough to the selected seaports that much of their equipment will move by highway. Other units will have to use the all-rail method of deployment. Rail volume depends on the nature of the contingency and the location of the seaport of embarkation.

This means that the military could call upon the national transportation community to provide as many as 5,400 railcars for movements as early as the first week of a major contingency deployment. Proximity of the deploying installations to ports should enable many of these railcars to recycle, thus reducing the number of cars used. Because the composition of the corps units and support command forces will be determined by the contingency situation, approximately one-half of these trains will begin their journeys at many locations around the country. This is because the units that will make up the corps forces are not located at just one installation, but are dispersed around the country.

Not all the railcars used to support the deployment will come from commercial stocks. DOD owns several hundred special-purpose flatcars and is pursuing the procurement of more. The idea is to position these cars at the installations where the earliest deploying units are stationed to ensure immediate availability. Most, however, must come from commercial sources.

These railcars moving along the nation's commercial railways will compete for line use, power, and access at both the installations and ports. Most will be flatcars loaded with wheeled and tracked vehicles. Many other railcars will transport containers, thus representing truly intermodal trains.

In addition, sustainment cargoes will start to flow through the commercial ports about this time. Most of these supplies will move in containers on a regularly scheduled or specially developed liner service. A recent

study identified as many as 61,000 20-ft equivalent units (TEUs) of supplies and equipment that could move to the theater of operations to support deployed forces. The containers will contain such varied loads as regular resupply, refrigerated supplies, and ammunition.

The impact on the transportation system created by the requirement to rapidly project an Army force capable of fighting and sustaining itself will be significant. Even though the aggregate cargo estimates may pale in comparison with a commercial intermodal system that moved approximately 2.7 million TEUs of containers and trailers in the first 18 weeks of this year, the military's unique operational and cargo handling requirements could certainly test the industry. Support of DOD requirements without crippling the nation's commercial activities will be an enormous challenge.

It is important to note here that although the armed forces have developed detailed movement plans for many potential contingencies, the nature of conflict requires great flexibility. As the operational scenario evolves, changes in force composition and sequencing are inevitable. This means we must have near-real-time visibility of cargo and equipment already en route. We must have the capability to communicate with key planners and operators throughout the transportation pipeline if cargo diversion or priority changes are necessary. The defense establishment is actively working to ensure realization of this in-transit visibility and communication capability.

We need to conceptualize and plan for certain scenarios. Large rail movements, originating at as many as 8 to 10 military installations, begin to move toward the ports. Each day hundreds of additional railcars move along the nation's rail corridors transporting DOD cargo, deploying units that load the cars at the installations and unload them in the ports, in less time than ever before. Whether mobilizing unit equipment, fighting vehicles, or containers, the very narrow window of time offers a greater challenge to mobilization than any the country has ever experienced. This is a challenge that DOD planners and industry experts are addressing every day. Let's now address one major component of the deployment-seaport operations.

AT THE PORTS: THE SEALIFT QUESTION

The deployment has begun, the trains are rolling, and the units start arriving at the seaports. What types of vessels do we require? How many of them do we need? A rapidly deploying Army can't rely on the small, slow-loading breakbulk ships of yesterday. The obvious vessel choice for movement of heavy Army units is roll on/roll off (RO/RO) ships. From where will these ships come?

The initial surge deployment will require support from at least 36 large RO/RO ships. This breaks down to 18 vessels for the combat forces' deployment and an additional 18 to support the corp's support command. The follow-on to the initial surge may require the same amount of vessels. We do not currently have 72 large RO/RO vessels under U.S. control. In Operation Desert Storm, allied nations augmented our deployment fleet. In future conflicts, we may not be able to depend as heavily on logistical support from allied nations. We may find ourselves acting independently of our allies. From where, then, will vessel support come?

To continue with our scenario, the U.S. Navy currently operates 8 fast sealift ships (FSSs). These ships have successfully supported our forces' deployment needs for many years. There are 29 RO/RO vessels of various sizes in the Ready Reserve Fleet (RRF). To meet the requirement for rapid-surge sealift, Congress appropriated funds to begin the acquisition of up to 19 large, medium-speed, RO/RO strategic sealift ships to augment those currently on hand. Of these, eight will be used for prepositioning Army equipment, leaving 11 additional RO/RO ships to support contingency deployment. These new vessels, with the FSSs and RRF ships, will bring the total RO/RO count for surge deployment to 48, still leaving us dependent on the shipping industry. For the remainder of this sealift requirement, DOD is looking at a variety of solutions.

THE IDEAL INTERMODAL MARINE TERMINAL

From the perspective of the military transportation professional, the ideal marine terminal will contain certain features that will make it more user-friendly when supporting military deployments. The military transporter sees the terminal in the context of its capability to support their operation. More specifically, they see it as the sum of the three necessary transportation subsystems: reception and terminal handling, staging, and vessel loading.

The terminal's capability to receive and process military cargo is the first subsystem considered. The terminal should be accessible to military equipment arriving by highway and rail. Ideally, there will be a separate gate in which arriving convoys can enter the terminal. In the best of cases, this gate will be located far enough away from the gates normally used by commercial traffic so that the military operation doesn't interfere with day-to-day commercial users. This

segregation is critical to the safe, secure, and efficient reception and handling of DOD's sensitive and hazardous cargoes. The terminal's internal road network should allow movement through the gate to reception areas in a safe, nonconfusing manner. Traffic-flow patterns must be well thought out in advance.

The terminal should be capable of receiving and unloading about 200 to as many as 400 flatcars daily. Railcar unloading requires an adequate number of rail spurs with end ramps to support the "circus" style of unloading military wheeled and tracked vehicles. Each spur ideally would have sufficient length to accommodate about 20 89-ft flatcars. We assume one ramp can support the offload of about six railcars per hour. Given a 20 hr workday, this establishes a requirement for about four end ramps (4 ramps x 6/hr x 20 hr = 480). Either fixed or portable end ramps are acceptable.

Once the equipment arrives and completes the reception process (e.g., unloading, inspection, documentation, etc.), it requires staging to await vessel loading. The ideal staging area will include sufficient space to safely store and work around the cargo as well as offer other work areas needed to support the operation. The Army provides a support element known as a port support activity to help manage the deployment. This unit consists of drivers for specialized equipment (e.g., tanks and other tracked vehicles), mechanics, a field-kitchen support group, and other personnel as required. These personnel need areas within the terminal to perform their missions.

As a planning guideline, we estimate that the ideal terminal will offer at least 45 and as many as 86 acres of staging area to support the movement of each division. This computation is based on the size of the cargoes to be loaded on the ships and the number of ships being loaded. The formula we used to determine the amount of staging area is

(CA x S/A) + (CA x SV) + (CA x WA) = Total Staging Area

Where: CA = Usable Cargo Area Per Ship in Square Feet or Meters,
S/A = Safety/Accessibility Factor, Normally 2,
SV = 2 = Factor to Account For Follow-On Vessel, and
WA = .75 = Factor to Account for Working Areas, Multiple, Vessels, Rail and Convoy Reception Areas, etc.

Note 1: SV factor represents that while equipment staged in one area is loading, the next vessel's cargo is being received and staged to await loading.

Note 2: The Fast Sealift Ships have an available cargo area of about 206,000 ft^2. Experience has shown these vessels have a stow factor of about 71 percent +/-, thus rendering about 147,000 ft^2 of cargo loaded per vessel. The LMSR vessels will have about 350,000 ft^2 of available cargo area. We expect these ships will have a stow factor of about 75 percent, and will provide about 262,500 ft^2 of usable cargo area.

Note 3: If the Port Support Activity containerizes vehicles at the port then they will require more working area than the formula indicates.

The last of the three subsystems is the vessel-loading subsystem. The ideal terminal will provide adequate berthing for three Panamax-sized ships. The vessels we plan to use are RO/RO or RO/RO combination container ships; therefore, the terminal needs to support this type of loading. Container cranes should support each of the berths. The berth aprons should support loads of at least 600 lb ft^2, however, 800 lb ft^2 is preferred. Deck heights above the water shouldn't be too high or low compared with tidal variation, because this could cause RO/RO ramp angles to exceed load capabilities for some equipment and might require work stoppages at tidal limits. Depth alongside the berths should be at least 38 ft. Minimum channel depths between the berths and open water ideally will equal 40 ft or more.

The greatest difference between this ideal marine terminal and the types of terminals that have traditionally supported military operations is that we historically have used breakbulk terminals. In the high-speed environment of future military deployments, the old narrow-aproned breakbulk berth with an adjacent transit shed is inadequate. In the future we will need to load RO/RO cargoes and containers so rapidly that older terminals will not effectively support us. How then do we blend DOD's future needs with those of the intermodal industry? We believe the answer lies with dual-purpose terminals, with multivessel capability.

HOW CAN THE INTERMODAL INDUSTRY HELP?

As the military transporters look to the future, they try to imagine what changes that future will bring. The commercial sealift industry is changing. The terminals of today are significantly different from those of yesterday. Perhaps tomorrow's terminals will change even more. We must work with industry to ensure these changes will offer solutions to the military deployment problem, not greater challenges.

As the intermodal industry goes about making improvements in its methodologies and systems, it

should keep in mind that intermodal doesn't always mean container. At times, intermodal simply means transshipping cargo among the sea, highway, rail, and air modes of transport from one area to another.

Containers will transport much of our deploying equipment. Such shipments will fit the "pure" intermodal model. Most will start out at the origin shipper and move through the network just like any other intermodal shipment. Some of the containers, however, will accompany the deploying troops, requiring great coordination and communication. Other equipment moving in breakbulk configuration will have to be moved using the commercial system and will require special handling. We must unload cargo quickly and safely as it arrives at the port. In the interest of national security, we cannot afford to let future intermodal facility enhancements impede military deployments.

Even though the industry is shifting from RO/RO to container ships, ports chosen to support future military operations must remain capable of loading RO/RO and RO/RO-container ships. These types of vessels will remain the ships of choice to support military deployments for the foreseeable future. Plans will likely integrate more containers and container ships into the deployment mix, but they will never replace RO/ROs any time soon.

The defense community is actively considering alternatives to traditional shipping methods. For nearly 20 years we have been looking into the container question. We have conducted numerous analyses of the operational and technical aspects of moving ammunition, general resupply cargo, and unit equipment in containers. In recent years we have exercised the intermodal system directly. In Exercise TEAM SPIRIT 93, we moved an entire Army unit from Fort Lewis, Washington, to Korea using containers for most of the unit's equipment. Last year another intermodal initiative, TURBO CADS 94, exercised intermodal movement of ammunition between depots in the United States and Korea. Likewise, DOD, through the U.S. Transportation Command, has earmarked millions of dollars in fiscal years 1995 to 1999 for intermodal events in the chairman of the Joint Chiefs of Staff exercise program. These efforts have been and continue to be part of a structured, integrated approach to the refinement of operational plans, procurement programs, and policies for the military's efficient use containers. Through these efforts we have gained an appreciation of the potential impact of intermodal and container use on future mobilizations and how these may influence the deployment choices for today's power-projection military.