

Navy Logistics Over the Shore: A Capability Worth Retaining

CSC 1998

Subject Area - Logistics

## **EXECUTIVE SUMMARY**

**Title:** Navy Logistics Over the Shore: A Capability Worth Retaining.

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**Thesis:** The Navy needs to improve its Logistics Over the Shore capability in order to be ready for potential future missions.

**Discussion:** This historical examination of naval logistic support to amphibious operations illustrates the need for the Navy to improve its Logistics Over The Shore (LOTS) capability in order to be ready for future missions. It takes a look at the history of LOTS operations at Guadalcanal, Da Nang and DESERT STORM in order to create an historical perspective. It then examines the Navy's current ability to conduct LOTS and looks at future prospects for improved capability.

**Conclusions:** This paper finds that while a Navy LOTS capability exists now, it is inadequate to the needs of Marine Corps forces. Equipment improvements and aggressive logistics exercises are required to fulfill the Navy's operational requirement to sustain amphibious forces.

# Report Documentation Page

*Form Approved  
OMB No. 0704-0188*

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE <b>1998</b>	2. REPORT TYPE	3. DATES COVERED <b>00-00-1998 to 00-00-1998</b>			
4. TITLE AND SUBTITLE <b>Reorganization of Marine Corps Aviation Associated Logistics</b>		5a. CONTRACT NUMBER			
		5b. GRANT NUMBER			
		5c. PROGRAM ELEMENT NUMBER			
6. AUTHOR(S)		5d. PROJECT NUMBER			
		5e. TASK NUMBER			
		5f. WORK UNIT NUMBER			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>United States Marine Corps, Command and Staff College, Marine Corps University, 2076 South Street, Marine Corps Combat Development Command, Quantico, VA, 22134-5068</b>		8. PERFORMING ORGANIZATION REPORT NUMBER			
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)			
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)			
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>Same as Report (SAR)</b>	18. NUMBER OF PAGES <b>37</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

**NAVY LOGISTICS OVER THE SHORE:  
A CAPABILITY WORTH RETAINING**

by

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Thesis submitted to the Faculty of the USMC Command  
and Staff College in partial fulfillment of the requirements for  
the degree of Master of Military Studies

April 1998

The views expressed in this paper are those of the  
author and do not reflect the official policy or position of the  
Department of Defense or the U.S. Government

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## **NAVY LOGISTICS OVER THE SHORE:**

### **A CAPABILITY WORTH RETAINING**

## **NAVY LOGISTICS... FROM THE SEA**

Military forces have extraordinary logistics demands. The Marine Corps, when operating in MEF sized units, is no exception. While the Navy has developed the capability to land Marines on an unimproved beach at high speed and at long range, their ability to support them with logistics has lagged. The ability to offload ships without the benefit of fixed port facilities is called Logistics Over the Shore or LOTS. While LOTS capability rests with both the Army and Navy, the ability of the Navy to conduct LOTS on their own has been required in the past and may be needed again. A historical examination of naval logistic support to amphibious operations illustrates the need for the Navy to improve its Logistics Over The Shore capability in order to be ready for future missions. This paper will take a look at the history of LOTS operations in order to create an historical perspective. It will then examine the Navy's ability to conduct LOTS and look at future prospects for improved capability. It will find that while a Navy LOTS capability exists now, it is inadequate to the needs of Marine Corps forces. Equipment improvements and aggressive logistics exercises are required to fulfill the Navy's operational requirement to sustain amphibious forces.

## **HISTORICAL PERSPECTIVE**

A great deal of our current capability is the result of the lessons provided by past operations. LOTS operations at Guadalcanal, Da Nang and DESERT STORM are examined here because they represent benchmarks in the evolution of our current capability. WW II represents the starting point for the study of modern logistics over the shore while operations in Vietnam illustrate the transition to modern systems. DESERT STORM lessons are used because they provide a glimpse into the possible problems and solutions of future operations.

### **LOTS Operations at Guadalcanal**

The landing at Guadalcanal on 7 August 1942 was the first U.S. amphibious operation of the war and was the first test of amphibious doctrine developed in the inter-war years. For this reason, logistics operations at Guadalcanal provide a starting point for the examination of future LOTS operations.

The procedures and equipment used at Guadalcanal were not adequate for the task of offloading supplies. Supplies were winch-lifted from the holds of ships on to lighterage and slowly offloaded at the beach by sailors or marines only to be hand carried again to vehicles. Since not enough manpower was allocated to the task of offloading the lighterage at the beach a chaotic situation developed. As boats offloaded, supplies were left on the beach and ruined by the incoming tide. At one point, it was estimated that nearly one hundred boats

were waiting to be offloaded on the beach while another fifty waited for a chance to land.<sup>1</sup>

The inefficient landing and handling of supplies at Guadalcanal had negative consequences. Because enemy air attacks forced support ships to leave on 9 August, less than half of the supplies that General Vandegrift had embarked actually made it to the beach. None of the heavy construction equipment or five-inch guns had been landed. When an inventory of food found less than half of the food stocks had arrived, troops were cut to two meals per day. Inefficient staging on the beach could have led to disaster had Japanese bombing been more accurate.<sup>2</sup>

Lessons learned at Guadalcanal by both the Navy and Marines streamlined landings throughout the rest of the war. By the time of the New Georgia Group landings in late June 1943, there was a whole new way of doing business. Joint use of supplies was directed with plans for logistic landings and airdrops to troops on the ground. Shore parties were increased to offload lighterage. LSTs (Landing Ship Tanks), LCIs (Landing Craft Infantry) and LCTs (Landing Craft Tanks) fresh from U.S. shipyards were available for the landing. For the first time in the war supplies landed with or right behind the assault troops. The bottleneck shifted to the handling of material on the beach, as trafficability became the major stumbling block.<sup>3</sup>

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<sup>1</sup> George C. Dyer, *The Amphibians Came to Conquer: The Story of Admiral Richmond Kelly Turner*, (U.S. GPO, 1972) 350-353.

<sup>2</sup> John Miller, Jr., *The War in the Pacific, Guadalcanal: The First Offensive*, (Center of Military History, United States Army, Washington, D.C. 1989) 81.

<sup>3</sup> Dyer, 551, 587-592.

## Navy Lots Operations in Vietnam

The Navy's LOTS experience at Da Nang provides the largest number of lessons and insights for future operations for a variety of reasons. First, it was an enormous effort sustained for nearly five years. Second, it was a modern operation that utilized equipment similar to what is in today's inventory. And finally, it was accomplished in a theater that provided substantial environmental and force protection challenges.

On the morning of 8 March 1965, Battalion Landing Team 3/9 landed unopposed at Da Nang, Vietnam. Their mission was to reinforce the defenses of Da Nang air base and other designated areas. The Navy was given the task of providing logistic support to those forces and by 24 April 1965 formed the Naval Support Activity (NSA) Da Nang. It was the opinion in Navy circles that this support would be temporary and that the Army would take over port operations shortly thereafter. At that time, they had no idea that they were at the beginning of a nearly five year mission to support the forces in I Corps' Tactical Zone in one of the most expansive LOTS operations in history.<sup>4</sup>

In Da Nang, the Navy's planned turnover of logistics duties to Army units did not take place for a variety of reasons. First, the fighting units in I Corps were predominantly Marine units that the Navy had landed in an amphibious operation. Second, the Navy was already in the operational logistics business because they had overall responsibility for logistics support to military advisors in Vietnam

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<sup>4</sup> Frank C. Collins, Jr., "Maritime Support of the Campaign in I Corps", in *Vietnam: The Naval Story*, ed. Frank Uhlig, Jr., (Annapolis: Naval Institute Press, 1986), 202-227.

through the Navy's Headquarters Support Activity, Saigon. Finally, because the Army was faced with a large logistic support operation throughout southern Corps areas, they lacked the assets to support Marines operating in I Corps.<sup>5</sup>

As the U.S. military commitment to Vietnam grew, the capacity of NSA Da Nang grew. In 1965, in their initial support of Battalion Landing Team 3/9 and later III Marine Amphibious Force (III MAF), NSA Da Nang provided 35 thousand measurement tons (MT) over the shore in a single month. By September of 1969, the NSA was moving 471 thousand MT of cargo per month and had the largest concentration of lighterage and craftmasters in the Navy.<sup>6</sup> They also expanded their operations by establishing LOTS sites at Cui Lai, Phu Bai and several other locations.<sup>7</sup> Like most logistic operations the vast majority of the material arrived by sea.

With the redeployment of III MAF, the need for Navy support to I Corps diminished. The gradual turnover of logistic support functions to the Army began in 1969. Because the U.S. Marine Corps in Da Nang had a more protracted redeployment schedule than the Navy, the Army supported the Marines during their final redeployment. The Army relieved NSA Da Nang on 30 June 1970.<sup>8</sup>

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<sup>5</sup> Edwin B. Hooper, *Mobility, Support, Endurance: A Story of Naval Operational Logistics in the Vietnam War 1965-1968* (U.S. GPO Washington D.C. 1972), 50-70.

<sup>6</sup> Frank C. Collins, Jr., "Maritime Support of the Campaign in I Corps", in *Vietnam: The Naval Story*, ed. Frank Uhlig, Jr., (Annapolis: Naval Institute Press, 1986), 208.

<sup>7</sup> Collins, 211-214.

<sup>8</sup> Collins, 225.

## **Overcoming Challenges at Da Nang**

In nearly five years of operations, NSA Da Nang was highly successful in overcoming challenges in the form of severe weather, environment and enemy interdiction. Their solutions can be analyzed by dividing them into in three categories: facilities, equipment and personnel. Problem resolution at Da Nang is illustrative of how similar problems might be dealt with in the future.

### **Facilities**

**Medical.** One of the most critical facilities to the Marine Corps was a Navy field hospital that provided over 650 beds at peak operation.<sup>9</sup> The hospital ships USS *Repose* (AH-16) and USS *Sanctuary* (AH-17) augmented this capability; by 1967 a hospital ship could be maintained off the coast of Da Nang continuously.<sup>10</sup> When the drawdown of the NSA occurred, the loss of the field hospital was of great concern to Marines left on the ground during their later stages of redeployment.<sup>11</sup>

**Port Improvements.** At the time of the amphibious landing, Da Nang was a fairly primitive port with no deep draft capability. There was one open roadstead (quay wall) and several small ramps that could accommodate the Navy Landing Ship Tank (LST) or Landing Craft Utility (LCU). The lone pier was

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<sup>9</sup> George Chapman, "Navy Corpsmen, Doctors, Nurses Set Record for Valor, Troop Survival, in Vietnam." *Navy Magazine*, Nov. 1970, 26-30.

<sup>10</sup> Hooper, 77.

<sup>11</sup> Charles R. Smith, *U.S. Marines in Vietnam: High Mobility and Standdown 1969*, (History and Museums Division, Headquarters United States Marine Corps, Washington, D.C. 1988) 266.

located up the Tourane River but could only handle shallow draft vessels.

Storage for bulk fuel and cargo was initially very limited and essentially had to be constructed from scratch.<sup>12</sup> The foul weather associated with the northeast monsoon hampered operations.

Because priority had been placed on developing the capacity of the airfield for jet capable aircraft, it was not until February of 1966 that the Navy responded to the limitations of Da Nang with a port improvement plan that greatly increased the capacity of the port.<sup>13</sup> The initial few thousand feet of storage area was expanded to acres of covered and refrigerated storage. Two deep draft piers were built. Public Works Da Nang became the largest facility of its type in the Navy and consisted of not just Navy Civil Engineers and Seabees but Vietnamese and foreign contract workers as well.<sup>14</sup>

During the tenure of the NSA:

- Dry storage was expanded by a factor of 27 to reach 900,000 square feet.
- Bulk fuel storage grew from 40 thousand gallons to 50 million gallons.
- The channel in Da Nang was dredged to allow the passage of the 1156 class LST.
- A craft repair facility was established in Da Nang that included a floating dry-dock. The ability to conduct craft overhaul eliminated the long transit to Subic Bay or Japan.
- The Chu Lai channel was dredged to allow fuel barges and coastal freighters to access the harbor.<sup>15</sup>

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<sup>12</sup> Hooper, 69-82.

<sup>13</sup> Hooper, 86.

<sup>14</sup> Charles J. Merdinger, "Civil Engineers, Seabees, and Bases in Vietnam", in *Vietnam: The Naval Story*, ed. Frank Uhlig, Jr., (Annapolis: Naval Institute Press, 1986), 235.

<sup>15</sup> K. P. Huff, "Building the Advanced Base at Da Nang" in *Vietnam: The Naval Story*, ed. Frank Uhlig, Jr., (Annapolis: Naval Institute Press, 1986), 187.

## Equipment

Since this was not an operation that the Navy planned for, the lighterage, crane ships, forklift trucks and other equipment had to be acquired on an ad hoc basis. Much of the equipment was antiquated or in short supply. In response to shortages, equipment was procured in so many types that spare parts support became complicated. Lighterage in particular was in such short supply that many of the craft looked like candidates for the scrap yard. A wide variety of craft were put into service that included barges, Landing Craft Utility (LCU) and commercial craft. Not all of the craft were efficient due to sea-state limitations and carrying capacity. The most productive lighterage was the LCU, which provided most of the support to I Corps prior to the construction of LST ramps.<sup>16</sup> One solution to the lighterage shortage included the purchase of six SKILAKs, a commercial off-the-shelf LCU type craft. These craft, designed for the Alaska trade, were ideal for the logistics role in Vietnam.<sup>17</sup> The Army dealt with the lighterage scarcity by contracting *Alaska Barge and Transport* and the *Luzon Stevedoring Company*, to provide lighterage service to their logistic bases.<sup>18</sup>

Next to lighterage the most critical equipment included forklift trucks, a variety of cranes, fuel bladders and communications and navigation gear. Expeditionary piers were an important item and several DeLong piers and floating causeway systems were placed in service.<sup>19</sup>

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<sup>16</sup> Collins, 222-223.

<sup>17</sup> Collins, 222-223.

<sup>18</sup> Joseph M. Heiser, Jr., *Vietnam Studies: Logistic Support* (Department of the Army, 1991), 170.

<sup>19</sup> Huff, 187-189.

## Personnel

The increase in size and scope of the activity at NSA required an aggressive approach to manning. Since the Vietnam rotation called for 12-month tours, a solution to manning problems was essential. Some of the initiatives involved:

- Instituting a 12 on 12 off rotation for all crews to enable 24-hour operations. (Most people worked much longer than 12 hours.)<sup>20</sup>
- A large number of contract workers were hired under the management of several U.S. firms including *Brown and Root* of Houston, Texas.<sup>21</sup>
- In the spring of 1966 the Navy instituted the *Direct Procurement of Petty Officers Program* to recruit personnel with skills in the building trades for work as Seabees.<sup>22</sup>

The requirement for security personnel was high and due to the sprawling growth of the facility ashore, grew as operational requirements expanded.

## Desert Storm- Taking Lessons From The U.S. Army

While the Navy did not participate in any LOTS operations in DESERT STORM, there are lessons to be learned from the Army's experience in LOTS operations and theater logistics in general. DESERT STORM provides insights into how logistics have changed since Vietnam and what future changes are still required.

DESERT STORM brought to light the predictable shortages in a variety of

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<sup>20</sup> Huff, 189.

<sup>21</sup> Merdinger, 247.

<sup>22</sup> Merdinger, 249.

critical logistics equipment.<sup>23</sup> Materials Handling Equipment (MHE), including forklifts and cranes, were in short supply as were refrigerated containers and tanker trucks. Host nation support proved critical. Over 5,000 trucks were contracted from the host nation to deliver fuel to forward elements. All 2,000 refrigerated vans used in that war had to be contracted.<sup>24</sup>

DESERT STORM also highlighted a problem in asset visibility with respect to containerized cargo. Over half of the containers sent to the Gulf War had to be opened to determine their contents. The loss of visibility of supplies often resulted in containers being hauled out into the desert only to find that 10 percent of the cargo was for front line troops and 90 percent was intended for units in the rear.<sup>25</sup>

If ever a war could be fought in an area to our logistics advantage, the Persian Gulf was that location. Modern port facilities, airfields and road networks favored our sea based deployment capabilities and our mechanized form of warfare. Even with two of the world's most modern seaports – Ad Dammam and Al Jubayl – Army LOTS operations were required in DESERT STORM to run ammunition up and down the Saudi Arabian coast to reduce the traffic on a critical highway.<sup>26</sup>

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<sup>23</sup> OPERATION DESERT STORM: Transportation and Distribution of Equipment and Supplies in South west Asia, Report to the Chairman, Subcommittee oversight of Government Management, Committee on Governmental Affairs, U.S. Senate (U.S. GAO code 398072), 1-15.

<sup>24</sup> William G. Pagonis, *Moving Mountains: Lessons in Leadership and Logistics from the Gulf War*. (Boston: Harvard Business School Press, 1992) 203-206.

<sup>25</sup> Pagonis, 206.

<sup>26</sup> Pagonis, 50.

## **PRESENT CAPABILITY – CAN NAVY LOTS SUCCEED NEXT TIME?**

In looking at future LOTS operations several questions come to mind. Perhaps the first question to be asked is "Will the Navy be expected to conduct a sustained LOTS operation similar to the one at Da Nang?" Joint Publication 4-01.6 indicates that after landing the assault echelon and the assault follow on echelon, the Navy will provide LOTS support to the forces they landed. Upon the arrival of Army discharge forces, the operation will transition to a Joint Logistics Over the Shore (JLOTS) operation under Army command.<sup>27</sup>

Within this framework, does the Navy have the capability to fulfill their obligations as stated in Joint Doctrine? Further, could they conduct a Navy LOTS operation if Army discharge forces and lighterage were obligated elsewhere? A look at current capacity in terms of facilities, equipment and personnel provides some insight.

### **Current Facilities**

Our ability to build adequate facilities will be based on the environment, terrain, threat and throughput requirements. For this reason, it is perhaps most difficult to gauge the Navy's current capacity to provide facilities as were built at Da Nang. It is clear that a large commitment from Seabees and Civil Engineers would be needed and required early in the time phased force deployment

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<sup>27</sup> Joint Pub 4-01.6, *Joint Tactics, Techniques, and Procedures for Joint Logistics Over-the-Shore (JLOTS)*, 22 August 1991, II-18.

document (TPFDD) flow. Contractors would have to be considered early in the planning for development of the site.

Proponents of OMFTS have viewed the concentration of logistics functions in a single place as an undesirable situation.<sup>28</sup> It is clear that a large logistics facility presents a great target to an enemy and a potential critical vulnerability for friendly forces. The solution to the problem may actually be found in a LOTS operation. A LOTS site could be employed to take the strain off a conventional port or to spread the functions of Combat Service Support out geographically. In any case, the development of a LOTS site on the scale of the one at Da Nang would probably not be desirable due to the risk of enemy interdiction.

**ELCAS Expeditionary Piers.** The Delong piers of the Vietnam era were replaced in the 1970s by an elevated causeway system (ELCAS) that includes cranes and a turntable. The ELCAS can be in place in 7 days and has a rated capacity of 10-12 containers per hour.<sup>29</sup> The ELCAS system was validated in the JLOTS II exercise although container handling capability was slower due to operator training variables.<sup>30</sup> The ability of the ELCAS to handle the tonnage required by forces engaged ashore will depend on requirements.

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<sup>28</sup> "Ship-To-Objective Maneuver: An Implementing Concept for Operational Maneuver From the Sea", *Marine Corps Gazette*, Nov. 1997, A-1-A-10.

<sup>29</sup> U.S. Transportation Command. "Joint Logistics Over-the-Shore (JLOTS)." *Defense Transportation Journal*, Oct. 1990, 22.

**Medical.** Medical facilities and medical support were a critical aspect of combat service support at Da Nang. Medical field hospitals will be a requirement at future LOTS sites supporting combat operations. While hospital ships and amphibious ships will be a vital part of the medical package and help to reduce the footprint ashore, shore facilities will be crucial to tend to the needs of patients who cannot be moved to ships when weather prevents flights.

### **Equipment**

Equipment has changed dramatically since the Vietnam era, especially in terms of landing craft, lighterage and ships.

**Landing Craft and Lighterage.** The Landing Craft Air Cushion (LCAC) and Navy Landing Craft Utility (LCU) 1610 class are the only two types of craft currently being deployed on amphibious ships. Of these two craft, the LCAC is clearly the centerpiece. By placing heavy emphasis on the LCAC, the Navy prepared for rapid over-the-horizon assault at the expense of logistic support. With a capacity of only 60 tons the LCAC is less efficient than the LCU in delivering cargo close to the beach. The LCU can carry nearly 180 tons and has a range of well over 1000 miles. The LCAC is limited to less than 200nm and needs to refuel far more often. The advantage provided by the LCAC is limited to working in areas that an LCU can not access due to draft. While LCUs are still in the fleet, they will eventually reach the end of their service life and are not due for replacement.

In a Da Nang scenario, with Army lighterage committed elsewhere, the backbone of a Navy LOTS operation would be the LCU, LCAC and Navy causeway lighterage. Given the scarcity of Navy lighterage and the limitations of LCAC, commercial off-the-shelf (COTS) lighterage and coalition partner support would be required. Remembering that over 250 craft were utilized at Da Nang alone, there would have to be a concerted effort to acquire these craft early. Since most countries have not adopted an LCAC based fleet of lighterage, our coalition partners could prove critical.

While some LCAC and LCU would travel to a LOTS site in amphibious ships, heavy lift of additional lighterage requires float-on float-off (flo-flo) capability that is in a world wide short supply. Because of the need to heavy lift MCM craft, port opening packages and Army lighterage, there is significant competition for flo-flo ships. It is likely that lighterage because of its lower priority would travel by flo-flo barge at considerably longer timelines. Lighterage would need to be included in the TPFDD if a LOTS operation were anticipated. The Navy could then better assess its ability to respond to LOTS operations at various phases in the campaign.

**Navy Ships.** The Navy does not own any of the bow-door LSTs that proved so useful in WWII and Vietnam. Only two 1156 class LSTs are in active service and 4 are in reduced maintenance status. These ships had the unique ability to land wheeled and tracked vehicles directly onto the beach. With the loss of all but two active duty LSTs, this capability is all but gone.

The term *turnaround amphibious ship* has been used to refer to a ship that has offloaded marines and has made a return trip to a friendly port to load the assault follow on echelon (AFOE) or sustainment supplies. These ships could return to the LOTS site for direct support to forces landed earlier. While they do not operate well with containers they are not dependent on container handling systems such as the ELCAS, and may be most useful early in the sustainment effort.

**Army Watercraft.** While Navy ships and lighterage have reduced in number dramatically over the last thirty years, the Army has developed some very capable ships with their LCUs and LSVs (Logistic Support Vessel). These ships, if available, would prove very helpful in a Navy LOTS operation. The Army LSV has a capacity of 2,000 tons while the Army's LCU 2000 has a capacity of 350 tons while drawing only nine feet of water fully loaded. Like the Navy LCU, both of these craft are fully capable of beaching and provide far more capacity than the Navy LCU.<sup>31</sup>

The Army has made a considerable investment in these craft and foresees them playing an important role in any future conflict. Maj. Keith Bax of the Army's Seventh Transportation Group, highlighted to me the importance of these craft. He stated that as long as there is time to move them into theater, Army

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<sup>31</sup> Beakley, Dan J. *Logistics Over the Shore: Do We Need It?* National University Press, 1982.

watercraft would be available to support a large amphibious landing as the operation transitioned to JLOTS under Army command.<sup>32</sup>

**Bulk Fuel.** One area where Joint forces have retained a strong capability is in the area of large volume petroleum supply over the shore. The Offshore Petroleum Discharge System (OPDS) and the Amphibious Assault Bulk Fuel System (AABFS) have the capacity to efficiently pump large quantities of fuel ashore. After full system deployment in seven days, one OPDS ship can supply 1.2 million gallons of fuel a day a distance of four miles.<sup>33</sup> The OPDS ship has the additional advantage of being able to remain on station and receive fuel from a tanker thus eliminating the need to return to port for refuel. The fuel is pumped to the tactical storage ashore where a Marine Corps Bulk Fuel Company, Army pipeline and terminal operating unit or Army supply unit receive it. The OPDS system is designed to connect to the Army's IPDS (Inshore Petroleum Discharge System) for delivery of bulk fuel to fuel dumps ashore. While there are limitations to this system, it could provide a far better supply of fuel than experienced at Da Nang. Exercises have demonstrated that these systems perform well in an operational environment.<sup>34 35</sup>

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<sup>32</sup> Keith Bax, (Major, U.S. Army), Assistant Operations Officer of the Army's Seventh Transportation Group at Fort Eustis VA, interview by author, 12 Mar. 1998.

<sup>33</sup> U.S. Transportation Command. "Joint Logistics Over-the-Shore (JLOTS)." *Defense Transportation Journal*, Oct. 1990, p. 22.

<sup>34</sup> JLOTS Tests Fuel Delivery Systems, *Army Logistician*, Mar-Apr 1993, 22.

<sup>35</sup> Jose A. Hernandez and Gary A. Holifield, *Providing Fuel to the Fight – Market Square '96*, <http://www.lee.army.mil/quartermaster/bulletin/market/html>, 29 March 1998.

**Pre-positioned Ships.** Another improvement in strategic sealift is the development of the military pre-positioned ships (MPS). The three squadrons of MPS ships represent a huge capacity for LOTS once they have been offloaded of their Marine cargo. They are equipped with Navy lighterage and can offload in-stream. Although they are limited to offloading in sea-state 2, they could provide substantial assistance in a LOTS operation. Their Amphibious Assault Bulk Fuel System (AABFS) mentioned earlier has the capacity to pump fuel to reception facilities ashore.

**The RRDF.** The Roll-On-Roll-Off Discharge Facility (RRDF) enables the efficient offload of MPF ships by providing a floating dock for vehicles to stage and embark lighterage. The platforms are essential for efficient offload of MPF ships but they also have limitations. There are strict sea-state limitations and they do not accept LCAC. They are not equipped with cranes.

**Intermodal Transportation.** The adoption of standard sized containers and the use of intermodal transportation have also increased efficiency.<sup>36</sup>

Intermodal transportation made possible the ability to ship from warehouse, truck, rail, ocean-going ship to final destination as one integral unit. Instead of loading thousands of boxes, drums or pallets on a ship, containers speed up the entire transportation system. Savings in time, accountability and documentation have been great. Ships are now loaded in hours instead of days.

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<sup>36</sup> Robert Moriarty (Capt. USAF) and Rudolph Turco (Capt. USAF), "History of Containerization Within the Military" *Air Force Journal of Logistics*, Fall, 1994, 33-41.

When intermodal transportation was coupled with a computerized system for tracking container contents and location, the gain in efficiency revolutionized cargo handling. Container status or In-Transit Visibility is now talked in terms of Total Asset Visibility. This capability is very recent and was not available during DESERT STORM. While computerized tracking of supplies is now the standard, the military will soon benefit from the ability to track cargo with precision and accuracy never before available.<sup>37</sup>

Containers present a number of challenges for the LOTS planner. While containers are designed for efficient handling by crane, most Navy material handling equipment is not designed to handle containers. Crane operations at sea are subject to sea-state and wind limits and are often ceased for environmental reasons. While ships designed to handle containers do so with great efficiency, containers often prove unwieldy on amphibious ships that were not designed to carry them.

Containers and in-transit visibility present a great opportunity to reduce the amount of material brought to a LOTS site ashore. By knowing exactly what is needed and exactly where it is, a tailored logistics package could be brought ashore and quickly delivered to the user. The reduction in shore facility acreage, and force protection requirements would be great. The drawback rests with a variety of amphibious equipment that is not designed to operate with containers

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<sup>37</sup> Paul Kaminski, "The Revolution in Defense Logistics", *Defense Issues*, Vol 10, Number 107, 1.

and combat units that have yet to prove that they can configure supplies in a container for speedy use in combat.<sup>38</sup>

**MHE.** With respect to forklift trucks, cranes and other equipment availability the next LOTS situation may not be unlike those at Da Nang and the Gulf War. There will clearly be shortages. Coalition partners, COTS and private contractors will be needed to respond to fill the requirements.

### **Limitations of Equipment Currently in Use**

**Landing Craft and Lighterage.** The LCAC has opened up 70 percent of the world's coastline to amphibious assault because of its capability to travel across obstacles and sandbars. It can travel at high speeds and reach landing sites from over the horizon with little regard for beach gradient. While the LCAC has presented greater options to amphibious planners, the Navy's ability to support those troops has not kept pace. ELCAS, causeway piers and the lighterage that would travel to them are constrained by draft and sea-state. While LCAC routinely operate at the upper ranges of Sea-state 3, all current LOTS systems are limited to operations in sea-state 2 or less.<sup>39</sup>

**Ships.** The draft of ships that would be involved in a LOTS operation is a potential limiting factor. A Korea scenario in particular would limit the ability of

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<sup>38</sup> Pagonis, 206.

those ships to access ports due to the shallowness of many potential LOTS ports. MPS and OPDS ships are particularly deep draft and are limited in their ability to access many ports. The OPDS system in particular requires a deep anchorage in order to use its single anchor leg mooring (SALM).

### **Personnel**

From a major command perspective naval personnel may be more prepared for a major LOTS operation than the forces at Da Nang. The expertise in conducting these operations remains at two Amphibious Groups in California and Virginia. The Naval Beach Group components of these commands train and prepare for the conduct of LOTS operations on a routine basis. While the expense associated with large logistics functions limits the scope of this training, the focus remains on getting the equipment and supplies ashore. Naval Beach Group One has participated in a series of challenging exercises in the Far East that involve innovative concepts worked out in challenging environments.

The Navy's LCAC based fleet presents different manning challenges than were faced at NSA Da Nang. While most sailors could develop the skills to become assault boat coxswains, LCAC craftmaster training is more like an aircraft pilot training program. If the Navy were called upon to run a small fleet of LCAC on a 12 on 12 off shift basis, they would run into a serious shortage of LCAC craftmasters. Only one LCAC crew is deployed per craft. Sustained LCAC

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<sup>39</sup> Committee on the Navy and Marine Corps in Regional Conflict in the 21<sup>st</sup> Century, Naval Studies Board, Commission on Physical Science, Mathematics, and Applications, National Research Council, *Re-engineering the Logistics System*, National Academy of Sciences, 1996.

operations routinely run into a *crew day* limit. LCAC operations, like flight operations, are guided by rules concerning crew rest.

Security personnel were vital to the success in Da Nang and will have to be included in future planning commensurate with the threat. Marine Inshore Underwater Unit (MIUWU) Coast Guard and other security teams will have to be considered for all phases of the operation.

### **The Current Concept: A Phased Operation**

The Navy's concept of operations anticipates a transition from amphibious methods to a LOTS operation with rapid command turnover from CATF to Naval Beach Group (Naval Support Element) and then to an Army Terminal Service Company. The extent of the Navy's involvement in a LOTS operation may follow the pattern of:

- Landing the assault echelon from amphibious ships.
- Deployment of the Naval Beach Group.
- MPS ships land the assault follow on echelon (AFOE) as soon as the threat allows. Deployment of the AABFS starts.
- Some elements of the amphibious force return to friendly ports for sustainment packages. (Turnaround amphibious ships)
- OPDS and ELCAS system deployment begins. Army terminal control groups arrive and establish command and control.
- Containerships arrive and begin offload to the beach and ELCAS when operational. If the capability of the ELCAS meets the needs of the forces ashore, amphibious ships phase out of operations.
- Army terminal service companies assume duties as JLOTS commander.

- If a commercial port is available, the Army will take control of port operations and make repairs as needed to operate the port.

There are of course endless variations on this theme to include:

- LOTS operations conducted in friendly ports that have been damaged by special operations forces, weather or cruise missile attack.
- LOTS operations to lighten the load in friendly held ports.

### **NO MORE DA NANGS?**

Prior to establishing an NSA at Da Nang, Navy leadership was divided on the subject of a LOTS operation. As late as 28 May 1965, the Chief of Naval Operations advised CINCPACFLT "do not concur to establishing NSA Da Nang." After pressure from the Commandant of the Marine Corps, the Navy agreed to conduct what they thought would be a temporary operation while looking to the Army to provide an Army Logistics Command to provide long range support. In the end, the Navy lost the fight and settled into a long-term commitment. The reality of the situation was that the U.S. Marine Corps needed logistical support and the Army was not able to provide it.<sup>40</sup>

Has naval mindset changed? The Navy has struggled since the Vietnam conflict to define the terms under which they would provide operational logistic support to forces ashore. Both Naval Beach Groups One and Two have exercised their logistic capability on a routine basis to maintain readiness. At the

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<sup>40</sup> Merdinger, 246.

same time, exercises have shown that commanders of amphibious task forces (CATFs) desire a quick turnover of logistic support operations to the Army, so that naval forces are ready for follow on operations. The desire for CATFs to shed their duties as LOTS commanders and the commitment of Naval Beach Groups to LOTS operations is consistent with both of their operational and tactical commitments.

The Navy is also concerned about not becoming involved in a long-term LOTS operation as was conducted at Da Nang. The reasons for this are fairly straightforward. First, Navy CATFs don't desire to be tied down to a long term logistics operation that would restrict their future employment. Second, the task is clearly assigned to the Army in Joint doctrine. The last and most important reason is based on capability. The Navy does not have the lighterage required to land large amounts of cargo in the beach as it did in the 1960s while the Army is trained, organized and equipped to accomplish the task.

In 1966 the Navy found itself reluctantly in charge of an extensive LOTS operation that lasted nearly five years. While Joint doctrine would indicate they might be spared having to repeat that experience, there are still circumstances that may require the Navy to conduct logistics support to forces ashore. These may include lesser regional contingencies and operations other than war when Army units are not deployed. While relief by the Army is the ideal situation, unplanned conditions may lead to situations where that is not possible.

## **TRADITIONAL LOTS - WHERE DO WE GO FROM HERE?**

Given the U.S. Navy's responsibilities under Joint Doctrine, what actions need to be taken in the near term (next five years) to prepare to discharge that responsibility? Several actions stand out as critical to bring LOTS capability in line with amphibious capability.

### **Fully Integrated Exercises**

Exercises are crucial in maintaining naval force readiness. In the Western Pacific, amphibious exercises are common, as are logistics exercises. Only occasionally are the two activities fully integrated. As an example, FREEDOM BANNER typically incorporates MPS ship offloads and AABFS employment without regard to an amphibious event. The MPS integration into TANDEM THRUST 1997 in Australia is an exception to this model. In this exercise, command and control, integration of the AFOE and rear area security played an active part. The exercise included participation by two MPS ships and one OPDS ship with extensive integration into the overall scenario. The result was greater interoperation of the Naval Force Commander (NAVFOR), the amphibious commander (CATF) and logisticians with associated command and control issues being worked out. The exercise highlighted the importance of playing out all phases of an amphibious event in order to familiarize all forces with the nature and challenges of a LOTS operation. Unfortunately, severe

weather (sea-state 3) associated with typhoon JUSTIN prevented accomplishment of some objectives such as instream offload events.<sup>41</sup>

TANDEM THRUST 97 provided a model for the direction that future naval exercises should take to fully practice all phases of a major amphibious landing. It laid the groundwork for the future of LOTS exercises that would integrate:

- Amphibious/AFOE/logistic sustainment phasing
- Turnover of duties from Navy LOTS to Army JLOTS
- MPF offload instream
- OPDS/IPDS connections
- ELCAS integration into amphibious exercises
- Rear area security with host nation participation

The inclusion of these activities in future exercises is critical to naval competency in LOTS.

**Army Integration.** Joint doctrine calls for Army relief of logistic support duties as the site transitions to Joint logistics over the shore. In order to have a successful transition, Army units need to be included in fleet and command post exercises to establish the conditions under which the turnover would take place. These conditions can then be written into various operational plans for execution when the need arises.

According to Maj. Keith Bax, of the Army's Seventh Transportation Group, the Army plans to participate in FOAL EAGLE in the fall of 1998. This will be the

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<sup>41</sup> Based on author's participation in TANDEM THRUST 1997 as CATF watch officer.

first time that the Army has been integrated into that exercise and the first time that JLOTS has been demonstrated in a Korean exercise. Seventh Transportation Group plans to have two LSVs, one LCU and the OPDS system participate in the exercise.<sup>42</sup> This represents a dramatic improvement in the exercise of Joint logistics in the Far East.

**Verifying System Operation.** In addition to keeping units current and trained, exercises test equipment and verify readiness levels. By including a wide range of LOTS equipment in fleet exercises, some of which rarely sees deployment, the operation and compatibility of systems is proven. The need to frequently deploy LOTS systems to verify operability is critical.

Because COTS systems provide many answers to LOTS problems, COTS system operational testing and evaluation needs to be an integral part of the exercise process.

### **Sea-State 3 Capability**

The modular causeway is a basic building block for administrative piers, RRDFs and ship lighterage. Unfortunately, current modular causeway systems are only sea-state 2 capable. A system called the Advanced Cargo Beaching (ABC) lighter has been developed based on the 40-foot container shape that is sea-state 3 capable. The ACB Lighter enables LOTS operations to be conducted an average of 25 days each month, vice 15 days with current lighterage

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<sup>42</sup> Keith Bax, (Major, U.S. Army), Assistant Operations Officer of the Army's Seventh Transportation Group at Fort Eustis VA, interview by author, 12 Mar. 1998.

capabilities.<sup>43</sup> The ACB lighter will bring the logistic support system closer to the capability and operating restrictions of the LCAC. The acquisition of these systems by both the Army and Navy is critical to the modernization of LOTS systems.

### **System Compatibility**

The shift to LCAC centered amphibious operations was not accompanied by a shift to rapid over the horizon logistics systems. The LOTS systems built in the 1970s were designed to interface with a narrow range of Navy lighterage and do not provide compatibility with LCAC and other systems. Concurrent with the implementation of sea-state 3 systems the development of LCAC compatible RRDF and ELCS systems is required. In addition, the ELCAS requires a ro-ro capability to enhance compatibility with vehicles.

## **NON-TRADITIONAL SYSTEMS - MAKING SEA BASED LOGISTICS A REALITY**

The need to reduce shorebased footprint has been recognized for many years. While the development of the LCAC renewed hope that the logistics system could remain at sea, authors recognized that the task of bringing large amounts of fuel, ammunition and water ashore always drove the establishment of a shorebased system. Laws of physics and current systems limit the size of force that can be supported from the sea. Some developments are needed to re-

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<sup>43</sup> Patrick R. Kane, "LOTS Development", *The Military Engineer*, Aug-Sep 1996.

engineer the current system to accommodate a larger force size and sustained operations.

### **The Marine Corps View**

Following the development of operational maneuver from the sea, the Marine Corps concept of logistics migrated to a sea-based concept. The Marine Corp's MCDP 4, *Logistics* describes how ships can be used as both "a means of moving supplies into a theater of operations and as mobile warehouses for resupply within that theater."<sup>44</sup> The current U.S. Marine Corps concept of *ship-to-objective maneuver* (STOM) also emphasizes sea-based logistics.<sup>45</sup> The establishment of a log base ashore is seen as an undesirable "operational pause." While they acknowledge the challenge involved, they maintain that the problem may be overcome by tailored logistics packages delivered to the using element. Just how these tailored packages are delivered is still an unsolved issue.

### **The Navy Perspective**

Naval forces currently have the capability to sea-base logistics for small operations of short duration using forward arming and refuel points (FARPS) and other air delivered supply methods. For a larger force, operating for a longer time, the requirements to provide bulk petroleum, ammunition, water and medical

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<sup>44</sup> Department of the Navy, Headquarters United States Marine Corps, *MCDP 4: Logistics*, February 1997.

<sup>45</sup> "Ship-To-Objective Maneuver: An Implementing Concept for Operational Maneuver From the Sea", *Marine Corps Gazette*, November 1997, A-1-A-10.

support will drive the establishment of a logistics base ashore.<sup>46</sup> Thereafter, the requirements to feed and berth people, maintain equipment, and provide security will increase the footprint of the support activity ashore.

The Naval Doctrine Command is in essential agreement with this view. Their current concept shows sea based logistics is “not a replacement for a multifunctional shore based Theater Logistics effort” but rather a phase in the overall logistics concept or one method for sustainment at the *less intense* end of the operational spectrum.<sup>47</sup> Sea based logistics reduces footprint ashore and reduces rear area security requirements and therefore is a valuable goal but it does not replace the need for a LOTS capability. This view is somewhat divergent from the Marine Corps view in that it does not envision a total dependence on sea-based logistics.

### **The Mobile Offshore Base – MOB**

The idea of creating a Mobile Offshore Base dates back to the beginnings of WW II amphibious warfare when naval officers argued for using ships as floating depots to support the advancing forces in the Solomons Campaign. The reasoning maintained that it would be less expensive than building port facilities at each successive base. There was even some experimentation with concrete barges in 1942 but they proved impractical. A shortage of steel prevented

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<sup>46</sup> Terrence P. Labrecque, "Seabased Logistics: Viable or Not?" *Marine Corps Gazette*, 74, Jan. 1990, 36-42.

<sup>47</sup> J. P. Dell (Cdr. USN), *Sea Based Logistics: A Naval Concept*, Naval Doctrine Command, 1997.

approval of a proposal to use large covered barges for the purpose. A shortage of tugs to tow them added to the demise of the initiative.<sup>48</sup>

The mobile offshore base concept has been revived over time in the 1970s and 1980s and is still very much alive today. The MOB is seen as one answer to the logistics problems posed by ship-to-objective maneuver.

### **Re-engineering the Logistics system**

The following steps have been identified by the Naval Studies Board to re-engineer the current logistics system to support sea based logistics.<sup>49</sup>

- Reduce force needs according to an advanced concept of operations
- Revise container packaging to accommodate user tailored packages.
- Capitalize on the DODs Total Asset Visibility program.
- Build an appropriate C4I program to support the concept.
- Improve systems to ensure the survivability of long range rotary-wing aircraft (CH-53E and V-22).
- Acquire a sea-state 3 LOTS capability.
- Reconfigure logistics support ships for their role as logistic support depots at sea. Enable ships to access containers individually, independent of *last-in first out* loading.

In addition, various sources have identified the need to pursue:

- Computer stabilized cranes.
- GPS guided unmanned helicopter delivery systems.

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<sup>48</sup> Richard M. Leighton and Robert W. Coakley, *U.S. Army in WW II: Global Logistics and Strategy*, 1940-1943. (GPO, 1955) 403.

<sup>49</sup> Committee on the Navy and Marine Corps in Regional Conflict in the 21<sup>st</sup> Century, Naval Studies Board, Commission on Physical Science, Mathematics, and Applications, National Research Council, *Re-engineering the Logistics System*, National Academy of Sciences, 1996.

- An upgrade to the current MPF that would allow individual selection of containers as needed.

## **CONCLUSION**

Joint doctrine clearly tasks the U.S. Army with conducting JLOTS operations to sustain amphibious forces ashore. While the Navy is not capable of duplicating that capability, they need to have the ability to sustain amphibious forces until Army units arrive. Given the unpredictable nature of military operations, they also need to be prepared to conduct a more limited LOTS operation if Army units are not available. If the Navy is called upon to conduct a LOTS operation, they will have to be creative in their employment of facilities, equipment and personnel in order to achieve success. Use of COTS technology and private contractors could play an important role in filling the gap left by outmoded systems.

An upgrade of current LOTS procedures and equipment is in order. Equipment needs to be procured to provide the Navy a sea-state 3 LOTS capability, sea-state 3 container-handling technology and LOTS systems that are compatible with the LCAC. Total asset visibility should be acquired to reduce the amount of material brought ashore and avoid problems encountered in DESERT STORM. By upgrading key equipment and exercising Navy LOTS capability, the Navy will be able to accomplish its LOTS requirements as specified in Joint Doctrine.

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