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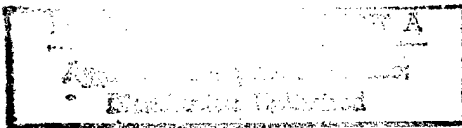
**PROTECTING THE AFLOAT LOGISTICS PIPELINE:
RECOMMENDATIONS FOR THE OPERATIONAL COMMANDER**

by

Commander (Select) Francis X. Tisak, SC, USN

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.



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Abstract

With 70% of the world's population and 75% of the world's capital cities within 500 miles of the sea, the operational commander will often utilize naval forces as a key instrument in operating across the operational continuum, and in shaping the environment needed to enhance national security. Key to the critical strength of this naval team is naval logistics, as it supports the operational commander's ability to conduct forward presence, peacetime engagement, deterrence operations, timely crisis response, and war at sea and war from the sea.

However, nearly all of the ships that comprise the afloat portion of the logistics pipeline are unarmed, and thus vulnerable to enemy attack. By sinking or damaging logistics ships, an enemy can seriously disrupt the synchronization and sequencing of operations, cause logistics to become a tighter constraint, accelerate a culminating point, and even cause an operational commander to abandon an area of operation. And perhaps of greatest concern, severe casualties and delays resulting from attacks on logistics ships may turn public opinion against the operation, and potentially force the National Command Authority to withdraw forces before achieving strategic objectives.

To negate the serious ramifications of having the afloat logistics pipeline ruptured, the operational commander thus needs to review the potential threats and then apply prudent force protection. In doing so, he will be better able to project national power, sustain his forces and mitigate the risks associated with keeping his supply ships defenseless.

Introduction

“Logistics provides the physical means for organized forces to exercise power. In military terms, it is the creation and sustained support of combat forces and weapons. Its objective is maximum sustained combat effectiveness.”

--Rear Admiral Henry Eccles, USN (Ret.)¹

Today's operational commanders are poised to operate at any time across the spectrum of conflict, and in any part of the world. With 70% of the world's population and 75% of the world's capital cities within 500 miles of the sea, the operational commander will often utilize naval forces as an essential instrument in functioning across the operational continuum, and in shaping the environment needed to enhance national security. Key to the critical strength of this maritime team is naval logistics, as it supports the operational commander's ability to conduct forward presence, peacetime engagement, deterrence operations, timely crisis response, and war at sea and war from the sea.² In simple terms, operational logistics involves positioning the necessary forces and materiel at the right place at the right time.³ While logistics may not guarantee operational success, such success is seldom, if ever, possible without adequate supply support.

In supporting his missions, the operational commander needs to lay logistics pipelines from his bases to the front lines. Through these logistics conduits flow the resources needed to surge as well as sustain operations. Combat logistics force (CLF), pre-positioning, ready reserve force, merchant and other such logistics ships comprise significant portions of these

¹ Chief of Naval Operations and Commandant of the Marine Corps, Naval Logistics (Naval Doctrine Pub 4) (Washington, D.C.: January 10, 1995), 3.

² Ibid.

³ Milan Vego, "Operational Logistics," in On Operational Art, March 1998, 179.

logistics pipelines. However, most CLF and supply ships are unarmed, and thus vulnerable to enemy attacks. By sinking or damaging logistics ships, an adversary can seriously disrupt the synchronization and sequencing of operations, cause logistics to become a tighter constraint, accelerate a culminating point, and even cause an operational commander to abandon an area of operation. And perhaps of greatest concern, severe casualties and operational delays resulting from attacks on logistics ships will impact U.S. public opinion: As the U.S. center of gravity at the strategic level is often the will of the American people, attrition and delays can weaken resolve, turn opinion against the operation, and potentially force the National Command Authority to withdraw forces before achieving strategic objectives.

Given the serious ramifications of having his afloat logistics pipeline ruptured, the operational commander needs to consider ways to protect his logistics ships. In addressing this force protection issue, this paper will first briefly describe the afloat operational logistics pipeline, and then examine a number of ways through which a determined foe can threaten these operational lifelines. This paper will conclude with a number of recommendations for the operational commander to consider in providing a prudent level of protection for his logistics ships.⁴

⁴ While this paper focuses on protecting the blue and brown water portions of the logistics pipeline, many of the concepts and recommendations contained within this paper also support protecting other segments of the logistics pipeline, such as ports of embarkation and debarkation, and airfields.

Afloat Operational Logistics Pipeline

The afloat operational logistics pipeline runs from the factory to the customer. When operating in or around their homeport, afloat customers submit their materiel requirements to the military supply system through their requisition point of entry⁵. In response, the supply system either issues the requested materiel from one of its supply centers, or passes the requirement to a manufacturer or vendor for direct delivery. Local transporters eventually truck the materiel to the ship at the pier. In the case of ordnance, Naval Magazines will satisfy customer demands in conjunction with ammunition onloads.

When deployed, ships generally submit their materiel requisitions to their supporting logistics ships. These supply ships satisfy the combatant's materiel requirements through the underway replenishment process. This replenishment process entails three principle steps, and involves merchant, shuttle and station ships:

- In the first step, merchant ships transport supplies from the United States to forward bases. Some of these forward bases of operations include Guam; Yokosuka, Japan; Diego Garcia; Jebel Ali, UAE; Rota, Spain; and Naples, Italy.
- In the second step, stevedores at forward bases offload materiel from merchant ships, and then consolidate and transfer these supplies to single-product Navy "shuttle" ships. They will transfer aircraft fuel, diesel fuel, and other petroleum products to oilers, place ammunition on board specially designed ammunition transport ships, and load stores,

⁵ A requisition point of entry can be either a regional supply center or a materiel item manager.

provisions, fleet freight and mail on stores ships. These shuttle ships then rendezvous with station ships and transfer their supplies to them.

- In the third step, the station ship transfers goods to combat ships. In effecting the transfer, the station ship will either operate as a "gas station," where combatants will meet her at a rendezvous point, or as a "delivery truck," where the station ship steams out to the combatant.⁶ Once alongside, the station ship will transfer fuel, stores, provisions, fleet freight, mail and other such products. While logistics ships can only transfer fuel to the receiving ship while alongside, other commodities can be transferred either while alongside through a connected span wire, or via vertical replenishment with helicopters.

Although these three steps represent normal afloat supply chain operations, a few variations may occur. In some instances, shuttle ships can rendezvous directly with the combatants. In other cases (particularly in a mature theater of operations), the second step is eliminated as station ships steam to the forward base of support to receive the supplies brought there by merchant ships. Yet through all these replenishment processes, the U.S. Navy has transformed operational logistics into a critical strength by establishing effective logistics pipelines that facilitate the nearly indefinite sustainment of forward deployed forces.⁷ Moreover, since these procedures do not change in wartime, they allow the operational commander's deployed warships "to train [logistically] as they fight."

⁶ U.S. Congressional Budget Office, Issues and Options for the Navy's Combat Logistics Force, (Washington D.C., April 1988), 7..

⁷ For a brief history of replenishment at sea, please see Appendix 1.

For forward deployed ground forces, the resupply pipeline resembles the afloat logistics pipeline. Pre-positioning ships deliver initial loads of combat wares, while sealift, ready reserve and other merchant ships deliver surge and sustainment goods from bases of operation directly to ports of debarkation. This materiel then flows to ground force customers, either directly, or via a supply dump.

Threats to Operational Logistics Lifelines

The U.S. Navy's ability to sustain its forces on station far from bases of support gives the operational commander tremendous flexibility and freedom of movement. The effect of this flexibility and freedom of movement is clear, as today, America has the military strength and the mobility to project national power just about anywhere she chooses. Moreover, the United States is the only nation that can rapidly move and sustain multi-division sized ground forces,⁸ expeditionary air force elements and carrier battle groups/amphibious readiness groups over great distances. Yet even as the United States enjoys this significant operational competitive advantage, would-be adversaries are examining these operational logistics concepts and are planning on ways to attack them.

Future regional opponents will recognize that they cannot prevail if they allow the United States an unimpeded supply train and months of uncontested preparation time. They may think that, by hitting U.S. forces when and where they are particularly vulnerable, they can have a better chance at military victory. These antagonists may also hope that by imposing casualties early on in the conflict, public opinion will turn against U.S. participation. Such thinking will not necessarily be limited to Major Theater Wars (MTW); those who wish to disrupt peacemaking, peacekeeping, humanitarian and other such operations may harbor similar thoughts.⁹

⁸ David Kassing, "Strategic Mobility: Overview of Current Issues and Future Requirements," (Prepared for the Office of Naval Research sponsored research and education symposium on Joint Logistics in the 21st Century, held at the Naval War College) March 6, 1997, p.24.

⁹ Ibid., p.24.

Counter-logistics operations can occur in a number of different ways throughout the pipeline and at any step in the replenishment cycle. The threat can occur either at sea, or in ports of embarkation and debarkation where supplies and equipment are often concentrated. Military leaders of potential enemies probably recognize that there is often a large U.S. logistics footprint ashore: Prepositioning sites, ports and staging areas all present lucrative targets¹⁰ as equipment, supplies, and personnel all tend to pile up at or near these areas. This is especially so within the United States, where port security is not as stringent as it was during the height of the cold war. A bombing similar to the 1995 Oklahoma City Federal Building bombing could wreak havoc at a crowded port.

Adversaries can develop several kinds of threats against shore-based logistics targets. While regional powers may opt for conventional air and missile attacks, they may also employ special operations forces and unconventional warfare¹¹ such as sabotage or weapons of mass destruction. The air and missile threat against forward logistics sites can be especially damaging to the afloat logistics pipeline to the extent that it will disrupt merchant ship deliveries and shuttle/station ship onloads.

Terrorist acts and sabotage against shore-based logistics sites present courses of actions that are difficult to defend against, and yet relatively inexpensive to execute. Moreover, even a weak adversary can inflict damaging results through terrorism or sabotage. Though terrorists have not attacked U.S. Navy ships in recent years, in-port attacks have been carried out

¹⁰ Ibid., p.25.

¹¹ Ibid., p.27.

against vessels from other countries. As an example, in 1981, terrorists planted a bomb within a pier that tore a hole in the side of the moored Spanish destroyer *MARQUES DE LA ENSENADA*.¹² Fortunately for the *ENSENADA*, the efforts of her damage control teams saved the ship. A similar type of explosion could be more catastrophic for U.S. logistics ships, as nearly all of these ships are minimally manned with civil servant crews. The reduced crew size leaves fewer personnel available for damage control efforts.

Today's terrorists and saboteurs possess standoff capability through precision-guided munitions such as the shoulder fired RPG-7. These weapons are readily available on the world arms market, and are simple to operate, relatively small and quite destructive (the RPG-7 can penetrate the skin of warships when fired from its maximum effective range).¹³ While these missiles can certainly harm U.S. logistics ships, they can also severely ruin warehouses, storage tanks and other elements of a forward base's logistics infrastructure. Moreover, coupling precision guided weaponry with chemical or biological warheads could make port facilities unusable.

While a determined foe can strike at the operational logistics pipeline ashore, he can also threaten the over-water portion of the pipeline with missiles, mines, aircraft, submarines and surface vessels. For logistics ships sailing across the open ocean, the threat would most likely come from surface ships, long range aircraft and nuclear submarines. Today, perhaps

¹² Michael E. Leonard, "Prepare to Repel Boarders: An Analysis of the U.S. Navy's Ship Self Defense Forces," (Unpublished Research Paper, U.S. Naval War College, Newport RI: 1984), 7.

¹³ Ibid., 4.

only the Russian Navy can pose an open ocean threat to this portion of the logistics pipeline. However, the open ocean threat can be especially destructive since merchant ships and shuttle ships typically transit the ocean unescorted. Additionally, since U.S. merchant and shuttle ships are civilian crewed, they are devoid of weapon systems (these ships have only small arms for self defense), and are thus generally defenseless.

As supply ships approach to and operate in the littoral areas, the range of threats increase, as diesel submarines, shore based missiles, short range aircraft, mines and fast coastal patrol boats can all pose severe hazards. Moreover, as the number of nations possessing these weapons increase, the operational commander may need to brace for these threats from multiple sources simultaneously. As an example showing how these threats can constrain or degrade operational logistics, suppose that Iran enters into conflict with the United States. Their diesel submarines can threaten the pipeline by operating at choke points such as those in and around the Straits of Hormuz, Suez Canal, and even the Straits of Gibraltar. Meanwhile, the Iranians could target ships approaching the Straits of Hormuz with Silkworm missiles. Additionally, they can seed major waterways with mines and engage logistics ships with anti-ship missiles launched from fast coastal patrol boats. Finally, an Iranian P-3 flying a kamikaze-type mission can possibly destroy an unarmed CLF, merchant or pre-positioning ship. An Iranian success in any of these actions can reduce in the near term both logistics responsiveness and combat power for the U.S. in the Arabian Gulf; repeated attacks and losses would be even more devastating.

Logistics Force Protection Recommendations for the Operational Commander

In protecting his afloat logistics pipeline, the operational commander has a number of courses of action from which he can choose from. However, as a first step, he needs comprehensive intelligence. The commander's J-2 needs to continually assess potential adversaries and their likely courses of action, so that possible axes and targets of attack may then be countered.

For the open ocean threat, the most effective way to protect the logistics ships is to include them under the protective umbrella of the carrier battle group. While the station ships are in better position to enjoy this coverage, merchant and shuttle ships steaming between the battle group and the forward logistics sites, along with pre-positioning and fast sealift ships, will remain at risk. To mitigate this risk, the operational commander can form these ships into convoys and allocate some of his combatants to escort this supply train. This course of action involves two particular implications: First the operational commander will need to synchronize his force deployment, operational and sustainment plans with the convoy schedules. Second, by allocating combat ships for escort duty, the operational commander will be thinning out his forward maritime defenses.

Other methods of decreasing the open ocean risk to supply ships involve deception.

Deceptive techniques can be especially fruitful against submarine threats. For example, if intelligence suggests that the enemy is only targeting military ships on the open ocean, the operational commander can then direct his CLF ships to present a non-military appearance by radiating commercial radars, employing merchant ship lighting and commercial ship paint

schemes, and sailing along commercial routes. Conversely, if intelligence maintains that all open ocean shipping is at risk, the operational commander can direct his CLF, pre-positioning, Ready Reserve and other supply ships to steam at high speed, and maneuver deceptively. Deceptive maneuvering includes sailing along a zigzag track and using turn count masking (method of disguising speed)¹⁴.

When countering the threat to pre-positioning, materiel staging and port areas, the operational commander will need to enhance defenses by providing a variety of active and passive systems. Chemical and biological defenses can also be deployed, as well as land based and naval anti-missile systems.¹⁵ For instance, the operational commander can employ Patriot missile batteries or station VLS capable Aegis guided missile cruisers to provide theater ballistic missile defense. For ships at anchor such as an MPS squadron, the operational commander will want to use high speed Coast Guard patrol boats to continually ring the squadron as a defense against small boat attacks. The Coast Guard can also be called upon for port security support both overseas and within the United States. As an additional port security measure, the operational commander can deploy special operations forces to help defend against unconventional attacks.

The operational commander can also diminish the threat to his logistics support by decreasing his reliance on any one single port. By using multiple ports, he will have access

¹⁴ George Beamer, "Logistics in the Maritime Strategy," (Unpublished Research Paper, U.S. Naval War College, Newport RI: 1986), 13.

¹⁵ Kassing, 27.

to alternative staging areas should a primary site become unusable. Additionally, the operational commander can limit exposing his CLF shuttle ships to in-port threats by having them transfer their materiel to station ships while at sea (either through alongside replenishment or via vertical replenishment). For supporting ground forces, the operational commander should consider logistics over the shore (LOTS) capabilities. Other initiatives to alleviate the vulnerability ashore include curtailing the “footprint” of the U.S. force. Improving the coordination of soldier and logistics flows can also lessen the mass of people and equipment in ports and staging areas.¹⁶ Finally, the operational commander needs to consider the placement of logistics assets. For example, keeping pre-positioning ships within the Arabian Gulf may be exposing these ships to needless risks if they can be anchored beyond the Straits of Hormuz, further away from the many potential shorter range threats emanating from within the Gulf.

As noted earlier, merchant ships, along with most CLF ships are civilian manned and unarmed. Operating these ships with reduced manning levels and devoid of weapon systems has allowed the Navy to reap significant maintenance and operations savings over the past two decades. However, along with this savings comes a significant amount of risk as the ships are generally defenseless. To mitigate this risk, the operational commander could significantly enhance the protection of these logistics ships by having them install self-

¹⁶ Logistics concepts such as the Army’s velocity management and the Marine Corps’ precision infrastructure initiatives aim to reduce stockpiles and other deployed logistics resources. Similarly, *Joint Vision 2010*’s concept of focused logistics calls for a reduced but highly responsive logistics tail.

defense systems. While not an all inclusive list, the following systems (among others) should be considered by the operational commander when devising force protections schemes:

Rolling Airframe Missile (RAM): RAM provides a high fire-power, but low cost missile self-defense system. These missiles are mounted in box launchers and thus do not require extensive handling or maintenance. With a range of five nautical miles, RAM could help supply ships defend against anti-ship missiles fired from either coastal patrol boats or aircraft.¹⁷

Close In Weapons System (CIWS): The Phalanx CIWS affords ships with a terminal defense against anti-ship missiles. Designed to engage anti-ship cruise missiles as well as fixed-wing aircraft at short range, the CIWS is a fully integrated weapon system; it automatically detects, tracks, evaluates and destroys incoming threats to the ship.¹⁸

25mm MK 38 Machine Gun System: This system, often referred to as a “chain gun” due to its chain-drive mechanism, offers excellent protection against surface targets to an effective range of 2700 yards. These guns can be operated in either a semi-automatic or automatic mode of fire.¹⁹ This system provides an effective defense against small boat attacks as well as against pirates that still operate in and around the Straits of Malacca. While this weapon is relatively inexpensive and has a small footprint, it does require gunners to operate it.

¹⁷ The Almanac of Seapower (Navy League of the United States: Arlington VA, 1993), 182.

¹⁸ Ibid.

¹⁹ Ibid., 184.

50 Caliber Machine Guns: Like the chain gun, the 50 caliber machine gun affords protection against both small boat attack and boarders. It has an even smaller footprint and is also relatively inexpensive. However, like the chain gun, the 50 caliber machine gun requires personnel to fire them.

Stinger Missiles: This shoulder fired missile is an infrared homing weapon that can effectively engage fixed-wing aircraft or helicopters at low altitudes. Stinger missiles have a range of three nautical miles and are very portable. A small detachment of stinger missile operators can provide continuous coverage against low flying air threats, such as the P-3 kamikaze cited in the previous section of this paper.

SLQ-32 Electronic Counter Measure (ECM) Systems: The SLQ-32 system, designed to confuse air and missile attacks, can help disguise logistics ships through electronic counter measures. The SLQ-32 system is also integrated with chaff launchers, which provide an additional defense mechanism against incoming missile attacks. However, this system is somewhat expensive and requires a cadre of specialists to operate it.

Chaff Launchers: Chaff launchers shoot canisters of foil into the air to confuse and decoy incoming missiles. These launchers have a small footprint and can be mounted on top of a ship's pilothouse. Chaff is pre-loaded and requires little maintenance.

Nixie Gear: Nixie gear consists of a “noisemaker” attached to the end of a cable that is trailed behind a ship. Emanating noise into the water can confuse enemy submarines and also cause some torpedoes fired against the ship to explode prematurely. This system is relatively inexpensive and easy to operate.

Unfortunately, installing these systems on all CLF, pre-positioning, ready reserve and other supply ships could be prohibitively expensive. As an alternative, mountings for the above systems can be attached to the ships. The actual systems themselves could then be drawn from a pool of such assets and added when intelligence suggests that the threat environment is increasing. Additionally, the weapon systems can be installed to match the operating environment: RAM, SLQ-32 systems, chaff launchers and Nixie gear can be installed on those ships operating over the open ocean. Meanwhile, ships steaming in the littorals will need stinger missile detachments, chain guns and machine guns. Additionally, CIWS can be added to all logistics ships for all-around defensive coverage. As a real world example, during the Gulf War the Canadian Navy added the CIWS and a stinger missile detachment to help protect their replenishment ship, *HMCS PROTECTOR*. In funding these systems, the operational commander should present these requirements in conjunction his input to the Chairman’s Program Assessment (CPA), the Defense Requirements Board (DRB) and the Program of Memoranda (POM) process.

It may be difficult to reverse the minimal manning levels onboard logistics ships in view of the cost savings the Navy reaps with reduced crews. However, as a cost effective alternative,

the operational commander can request that Naval Reservists be allocated to the logistics ships to operate the weapon systems when required. This allocation would also serve the Reserve community well by furnishing Reservists with excellent training opportunities. Such an approach has been successfully implemented before: Naval Armed Guard crews provided defensive capabilities to merchant ships during WWII when none existed beforehand.

As final force protection issue, the operational commander's forces need to "train as they operate" across the spectrum of conflict. Today, battle force exercises are often executed with few logistics constraints.²⁰ The operational commander and his staff need to plan for worst case scenarios and exercise force protection schemes (including logistics ship Reserve manning) accordingly. Supply ship attrition also needs to be incorporated into war gaming. Frequently, war gamers overlook logistics ship attrition despite the fact that these vessels lack self-protection. For example, while the Naval Logistics 2005 war game conducted at the Naval War College in 1995 wisely considered the impact of chemical strikes against forward logistics bases, it also failed to adequately account for supply ship attrition (the war gamers assumed that only one logistics ship, a pre-positioning ship would be lost in an Arabian Gulf conflict).²¹ By incorporating logistics and the attrition of logistics assets as an integral part of wargames, communication between the warfighters and the logisticians will improve, and operational commanders will see constraints on logistics as key operational issues.²²

²⁰ Frequently, the supply ships will replenish battle force contestants from *both* sides.

²¹ "Naval Logistics 2005 Wargame Overview and Executive Summary," (Unpublished Presentation, U.S. Naval War College, Newport RI: January 1996), 12.

²² John A. LaPlante, David P. Garner and Patricia Insley Hutzler, "Logistics in Wargaming: An Initial Report," Joint Force Quarterly, Winter 1995/1996, 97.

Summary

Everybody likes to talk about and analyze *strategy*. Some mystic quality about strategy and strategic planning and strategic decisions seems to arouse spirits of all to a sense of intellectual contest. But World War II turned out to be less a game of strategy than of logistics. There were certain obvious moves; there were certain choices, but more often than not the choice hinged on the logistical factors and implications rather than upon some abstract gamesmanship.

--James A. Huston²³

Operational logistics provides the wherewithal for the operational commander to mass the effects of combat power through mobility and sustainment. For forward deployed Navy carrier battle groups and amphibious assault readiness groups, operational logistics revolves around Combat Logistics Force, merchant and other such supply ships. Should the operational commander fail to protect these high value assets, the attrition of supply ships will limit his flexibility. At the strategic level, a shortage of logistics ships conceivably means that the Navy could not operate all of its battle groups simultaneously, an obvious drawback in a major theater war, or even in operations other than war. In sum, a shortage of logistics ships could diminish the sustainability of naval forces, reduce the capability to operate in different theaters simultaneously, decrease the tactical options available to fleet commanders,²⁴ and even lead to a loss of confidence on the part of the American people. Hence, the operational commander needs to protect his supply train. In doing so, he will be better able to project national power, sustain his forces and avoid the risks associated with keeping his supply ships defenseless.

²³ Henry E. Eccles, Military Concepts and Philosophy, (Rutgers, The State University), 1965, 67.

²⁴ Issues and Options for the Navy's Combat Logistics Force, 18.

Appendix 1: Replenishment at Sea

The Navy developed the ability to replenish warships at sea during the first half of the twentieth century. In the period around the First World War, major naval combat ships switched from burning coal to oil. This switch made refueling at sea feasible, since shipboard engineers can transfer oil in volume much more easily than coal. As a result, U.S. Navy ships began to refuel at sea as a matter of routine.²⁵ Having mastered refueling at sea, the Navy subsequently developed techniques and equipment for transferring stores, provisions and ammunition. By the Second World War, U.S. Navy combatants were conducting underway replenishments to satisfy the bulk of their logistical requirements.

The most important advantage of refueling and rearming at sea was an increase in staying power: Operational commanders no longer needed to detach their combatants from their operating areas to travel to friendly ports to receive fuel and ammunition. While the ships continued the battle on station, dedicated logistics ships could bring in required supplies. As long as the supplies kept flowing, the fighting forces could remain in combat nearly indefinitely.²⁶ This forward sustainment concept allowed U.S. Navy ships to remain on station longer. By remaining on station longer, the operational commander enjoys significantly greater freedom of action, and can cover a larger amount of physical ocean space with his combatants. Today, deployed U.S. Navy combatants continue to replenish from logistics ships on a routine basis.

²⁵ Ibid., 5.

²⁶ Ibid.

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