STRATEGY RESEARCH PROJECT

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ARMY AFTER NEXT AND HIGH SPEED SEA LIFT

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Army After Next and High Speed Sea Lift

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ABSTRACT

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One of the basic tenants of the Army After Next (AAN) is force projection. Force projection will require rapid strategic sealift at speeds that are currently unavailable. This study will review the forces that are driving the Army to conclude that it needs rapid sealift, what is currently available and what are the most cost effective means to meet the Army's requirements for material movement in the future.

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ARMY AFTER NEXT AND HIGH SPEED SEALIFT

Strategic lift is a significant issue for future Army warfare. The recent experiences of Desert Storm demonstrated the inadequacy of strategic lift capabilities. The outcome of Desert Storm may have been considerably less sanguine if Saddam Hussein did not allow the coalition six months to transport overwhelming forces with which to conduct an offensive campaign. Even given the significant amount of time to prepare, the strategic lift system displayed its numerous faults while attempting to move 500,000 personnel and their material to the desert of Saudi Arabia. In the seven years since the end of Desert Storm strategic lift is still a significant issue. It is in this environment that the Army is crafting its vision for the year 2025 which is known as the Army After Next (AAN). In its mission statement, the purpose of the AAN is to

> "conduct broad studies of warfare to about the year 2025 to frame issues vital to the development of the U.S. Army after about 2010 and provide those issues to senior Army leadership in format suitable for integration into TRADOC combat development programs." [1]

One of the foundations of the AAN is force projection. Force projection means that a battle force arrives at the site ready to fight in days instead of the weeks that are currently required. Central to this concept is the development and fielding of significantly faster sealift platforms capable of traveling speeds in excess of 40 knots. There are not enough aircraft to move the required amount of personnel and material to the battlefield to sustain offensive operations for any significant amount of time. The bulk of material movement will fall to sealift. Presently sealift cannot deliver the material in the amount of time required. This paper will review the forces driving the Army to conclude that fast sealift is necessary, what the current state and trends in strategic sealift are, what alternatives are currently available that may meet the AAN requirements and attempt to come to some conclusions about what the most cost effective means of meeting the vision of the AAN would be.

FORCES DRIVING ARMY INTEREST IN FAST SEALIFT

Although strategic sealift is one of the Navy's five enduring missions, the Army has always been dependent on sealift capability to sustain its forward presence. The Army's interest in fast sealift is based on several factors that characterize the post Cold War era: the reduction of prepositioned assets overseas, technology shifts that increase the range and potency of even third rate nations and the recent history of sealift itself. All of these factors are rolled up into the doctrine that is beginning to form around the AAN.

Reduced overseas presence

In the wake of the fall of the Soviet Union and in reaction to reduced defense budgets, U.S. military forces are reducing their overseas presence significantly. Troop concentrations in Europe have dropped from approximately 500,000 soldiers to 70,000. Numerous bases have been shuttered both in Europe and in the Far East (Philippines). General Dennis Reimer in his 10 August 1998 speech to the Army War College stated that 75% of the Army is now CONUS based, with the trend towards CONUS basing expected to continue. As foreign bases close, the pre-positioned, heavy war materials are returned to the U.S. This means that in the future the Army will need to carry most war materials into battle from the U.S. Paul Bracken points out in his article on the ***Military after Next***,[2] that military planners need to understand the immense distances that the Army must overcome in the future, especially in Asia where they will encounter armies with characteristics of all three of Tofler's "waves."[3] The logistics efforts will dwarf Desert Storm for a large, sustained battle against a first wave or determined second wave competitor in that arena. The "Strategic Engagement" Policy called out in the administration's national security strategy ensures that the Army and the other services will continue to require global strike capabilities.[4] A central tenet of the AAN is that the U.S. will not withdraw into isolationism, but remain engaged in world affairs, maintaining a military that can project power to support regional alliances and to deter or defeat any major military or economic competitors.[5]

Technology Shifts

The second force driving high speed transport will be the technology shifts that occur with ever increasing rapidity. The future, as envisioned by Dr. Dennis Bushnell, the Tofflers and Paul Bracken, provides a picture where even the poorest countries can afford the technology that will allow them to easily track and destroy slow moving targets that are still a considerable distance away. In such an environment, speed of movement and maneuver will be imperative. The current view of strategic maneuver was created during the Cold War and will provide any potential enemy with many targets in a "precision rich theater of war."[6]

Technology may also increase the speed of battle whereby if the Army cannot engage in a conflict within 72-120 hours, the decisive battle may already have taken place. The Army wants to minimize the time between the initiation of enemy action and the arrival of forces on the scene. This will reduce the capability that an enemy has to gain the tactical and operational advantage.[7] Not permitting the enemy to gain tactical advantage would save lives and material.

Recent Sealift Experience:

Historically, the U.S. has depended on commercial sealift for surge and sustainment capabilities. U.S. commercial sealift has stagnated in the last 40 years. Many critics feel that there are insufficient sealift assets either directly controlled or under contract with the U.S. government to maintain a lengthy Army ground campaign.[8] Desert Shield/Storm is our most recent sea lift experience. While the effort was an overall success, the experience highlighted the challenges and inadequacies of the strategic sealift efforts. There were several favorable circumstances that may not exist in the next conflict. The Iraqis afforded the U.S. a significant amount of time to prepare for the conflict. Host nation support and some of the world's finest port access were readily available. The ports were capable of receiving many more ships than were actually sent. Three million tons of equipment and six million tons of petroleum, oil, and lubricants (POL) were eventually moved during Operation Desert Shield/Storm.[9] The peak of the sealift effort saw 217 ships moving material across the Atlantic; 132 en route, 57 returning and 28 loading or unloading.[10] In spite of all the positives, strategic lift assets were still stretched thinly all over the world.[11] The critical constraint was the lack of roll-on and roll-off (RO/RO) ships that ferried unit equipment sets. The condition of the Ready Reserve Force (RRF) and the availability of U.S. hulls and seaman all played key rolls in Desert Storm. Some of the problems experienced during that conflict are still pertinent today.

The Ready Reserve Force:

The RRF, a large number of ships that are placed in reserve in various stages of readiness, did not perform particularly well during Desert Storm and many failed to meet their deployment goals. The ships were old, many built during the 1940s, and were mostly boiler propulsion rather than the newer diesel propulsion. These ships were difficult to maintain, difficult to operate and expensive to activate. There were not enough shipyards to activate the large number of vessels required, even if they were to remain in the inventory.[12] This inventory of ships has been cleaned up considerably since Desert Storm. The number of ships has been reduced and many of the older vessels have been replaced by newer RO/ROs.

Availability of U.S. Hulls:

There were not enough U.S. flagged hulls to carry the requirements for the build up of the Gulf War. The situation is worse today. There has been a 93% drop in the number of U.S. flagged ships from the end of World War II to the present, falling from a high of 3,500 in 1945 to a low of 259. To put this number in perspective, during World War II, the Allies lost 5,150 merchant ships to enemy action. In 1942, the year of greatest losses, Allied ships were sinking at a rate of 137 per month.[13] Of the 259 ships in the current inventory, only 104 are ocean-going assets.[14] The other ships are either engaged in domestic commerce or under government contract. Foreign commercial vessels under charter were used extensively during Desert Shield/Storm. The continuing decline of the U.S. Merchant Marine indicates that the use of foreign bottoms will continue in the future.[15] Although the security problems inherent in using foreign vessels present difficulties, the reality is that there are no other assets available to lift supplies. Unless U.S. laws are revised to mitigate some of the factors leading to decline in U.S. hulls, there is little optimism that the trend will ever reverse.

Merchant Mariners:

During the Gulf War there were insufficient numbers of merchant seaman to man the ships in the RRF. The number of U.S. mariners had declined along with the number of U.S. owned ships. The U.S. was inviting 65 year old retired merchant seaman to return to sea to fill the requirements for the RRF.[16] In times of conflict, the Military Sealift Command (MSC) will require U.S. merchant mariners to man U.S. flagged ships carrying supplies for the troops in the field. Current numbers of U.S. merchant mariners are low and will continue to decline for the foreseeable future. According to the Maritime Administration, the initial phase of any crisis requires 2,638 U.S. mariners. Operating beyond a four month window would require 4,000 mariners.[17] The current pool of mariners is inadequate to meet these requirements. Last year at this time the Maritime Administration reported that there were only 7,627 U.S. mariners on ocean going vessels, which, according to several sources is not enough to man ships for an operation the size of Desert Storm and Desert Shield.[18] During the Gulf War, 55% of the eligible sailors were incapable of deploying. Assuming the same percentage would hold for a future conflict, there are not enough mariners for a sustained war.[19] Foreign seamen could fill in some of the gaps, but the use of foreign seamen raises national security issues regarding potential espionage and sabotage. Additionally, foreign nationals may not be willing to venture into harm's way to further U.S. national interests.

ARMY REQUIREMENTS FOR THE AAN:

All of the factors above and the desire for Army leadership to look out beyond Force XXI and begin the research and development that will lay the foundation for the next generation weaponry and tactics underlay the AAN. The thirty-year horizon will allow the Army to build the foundation for the future without current budgetary and institutional influences and to break with the traditional incremental approach to modernization. The AAN is truly an attempt to step outside the current paradigms and build tomorrow's war-fighting machine and not yesterday's. This approach will allow a future that is not "hostage to the past."[20] The Army After Next (AAN) doctrine outlines the Army's requirements for future strategic lift very succinctly. The AAN will build on the knowledge base created by Force XXI and add physical speed and agility to the organization. Speed and agility are the dominant elements in the AAN, requiring rapid deployment into the operational theater to project overwhelming power within days instead of the months experienced in Desert Storm.[21] As clearly stated in the AAN annual report to the Chief Staff Officer in 1997:

"A maneuvering force cannot hope to succeed against a determined, thinking enemy if its speed of movement cannot exceed the 20 kilometers per hour pace of a third cycle force. An information age army must move at ten times that velocity."[22]

Speed

The AAN envisions arriving on the battlefield within 72-120 hours with the firepower equivalent of a heavy division. This force projection will rely on velocity and not mass. Airlift assets are neither available in adequate quantities nor capable of carrying the amount of cargo required. AAN war games conducted at the Army War College in the summer of 1997 projected the use of a 500 ton craft capable of carrying a million pounds and traveling 4,000 nautical miles non-stop at speeds of 75 knots.[23] A sealift capability to provide power projection within 72-120 hours does not exist. The fastest ships currently available of any size are ferries with displacements of several hundred to several thousand tons that travel at speeds of 40 knots and more.[24] These craft are operated primarily in China and Australia. There are studies underway examining the feasibility of constructing high speed cargo ships that displace tens of thousands of tons, travel above 40 knots and are capable of transoceanic travel. The table below compares the capabilities of current lift platforms:

Platform	LMSR (new)	Fast Sealift Ship (FSS)	C-17
Capacity (square feet)	395,000	185,000	1,500
Sustained speed (knots)	24	27	400
Range (miles)	12,000	12,200	2,400

Table 1: *Capabilities of Primary Lift Platforms*[25]

Researchers at the Naval Surface Warfare Center, Carderock Division in Maryland estimate that using existing technologies a ship could be built to carry a load similar to a FSS which could travel 7,000 nautical miles at 40 knots.[26] This does not fully meet the AAN requirements. It is unclear whether these platforms can actually be built. Given current propulsion and power capabilities, the faster and farther a ship travels, the smaller the payload that can be carried. Speed and weight are closely linked. Current technology is very limiting in terms of weight to power ranges which are the ultimate arbiters of speed and distance. The tradeoffs now are a zero sum game. A 70 knot ship can be built with available technology, but its payload will be 5,000 tons or less and it will only have a range of 3,000 miles.[27] While such vessels may be scientifically achievable, their costs may be exorbitant and the risks to build them high.

The commercial shipping sector does not appear to be rushing out to embrace these technologies. The eight fast sealift ships

(FSS) in the MSC inventory, with top speeds of 34 knots, were considered too expensive to operate by the commercial sector. Shippers are interested in ships that can carry large cargoes at the most efficient speeds. Current technology does not allow for an efficient combination of size and speed. Unless fast sealift ships are commercially viable, it is unlikely that DoD will fund a new program that will cost significant amounts of dollars to build platforms that for the most part will be held in reserve for future use. While the commercial industry seems quite interested in the technology and its applications, the costs to develop such technology are not likely to encourage significant investments by the shipbuilding or the shipping industry. They will look to the government (DoD) to fund such research. There may be a long term payback in such research, but the current austere funding environment does not auger well for such risky investments.

Agility

The Army will need to significantly reduce the weight of its force to achieve the agility called for in its AAN vision. Decreasing the weight of the force means reducing the consumption of fuel, using smart weapons to minimize the amount of ammunition carried and leveraging technology to provide smaller, lighter weapons and weapon's platforms.[28] The AAN war games envision a 50% reduction in the amount of fuel consumed and a similar reduction in the weight of ammunition carried into battle. Fuel economy can be achieved by super-efficient engines using electric and hybrid electric vehicle technologies. Additionally, weapon platforms will be lighter as they are constructed with the lightweight material and composites used in some of the more advanced weapon's platforms like the B-2 and the F-117. [29] Weight will also impact fuel economy. Munitions weight will be effected by the capability of future munitions to assure very high first round probability of kill ratios. The higher the probability of a first round kill, the smaller the amount of munitions needed to carry into battle. Highly reliable parts with embedded diagnostics and fault sensors will help to shrink the logistics pipeline to minimum levels. Condensed rations that are acceptable to the soldier are another part of the weight reduction solution.[30]

While these are worthy goals, there has not been much progress in reducing the weight of the combat forces in the army. In fact, the weight of the combat forces is growing. The current inventory of heavy war material was constructed based upon a land battle with the Soviet Union. According to a Congressional Budget Office review, between 1987 and 1994 there was an annual growth in the tables of organization and equipment (TO&E) weight of army combat divisions of greater than 4%.[31] The table below shows the growth of the TO&E weight of the Army from 1989-1994 assembled from a Defense Science Board report:

Division	**Growth in Weight**
Armored	46%
Mechanized	49%
Infantry	31%
Air Assault	42%
Airborne	67%
Light Inf	35%

Table 2: *Growth of Army Weight from 1989-1994* [32]

The Army's newest self-propelled artillery, the Crusader, weighs over 50 tons. The M1A2 tank weighs approximately 70 tons. Not only is the increased weight reducing the Army's agility, but it is also placing a significant strain on the logistics assets that are available.

In order to rapidly project force, the Army must remove mass from its tactical units. Tanks and heavy artillery would have to be replaced by smaller, lighter, but equally lethal weapons. The current organizations and weapon's systems are all "second wave" structures and technologies, designed, according to Alvin Toffler in War and Anti-War, to fight yesterday's wars. Yesterday's wars were characterized by the movement of large masses of men and material buttressed by a sturdy and resilient industrial base. This is the experience of the Civil War and World War I and II.

Second wave war is not characterized by the rapid movement of men and material, but by the gradual build up troops and material over a long period of time. The changes to tactical units would have to be mirrored by changes in the logistics structure, a revolution in military logistics that may be of greater importance than the revolution in military affairs at the tactical level. Our logistics system is mass-based, characterized by massive redundancies. If tomorrow's battle force units are small, extremely mobile and self-sustainable for short periods of time like the U.S. Marine Corps, then the supporting logistics system must also be as mobile and deployable as the combat elements.[33] To achieve the speed necessary to ensure survival in the future, the operational forces will need a radically streamlined logistics tail.[34]

CURRENT SEALIFT ENVIRONMENT AND TRENDS

There appears to be a disconnect between the Army's vision of the future and what is currently occurring in DoD procurement of sealift assets. The AAN's concept of global maneuver requires a rapid sealift platform. The current focus of DoD sealift programs is not on investing in a new, more rapid lift capability, but in expanding the quantity of available sealift through the procurement of additional government owned hulls and enhancing prepositioned assets overseas in ships that are fully manned and ready to deploy within a few hours notice.

Expanding the Sealift Assets

Sea lift is governed by the Military Sealift Command (MSC) which is a three star Navy position. MSC is responsible for ocean transportation for DoD cargo to supply U.S. forces throughout the world.[35] MSC has primarily expanded its sealift role through the Ship Introduction Program and the Sealift Program.[36]

The Ship Introduction Program is responsible for the acquisition of new ships, including the conversion of ships to meet MSC and military specifications. The LMSR Program is the largest component of that organization. 19 new ships and conversions have been contracted for $6.5 billion with deliveries by 2001. Each ship is almost the size of an aircraft carrier. The LMSR construction program was the result of deficiencies in strategic lift discovered by the Defense Mobility Requirements Study in 1992 following Desert Storm. The study called for an additional three million square feet of surge sealift and two million square feet of prepositioning sealift.[37]

The Sealift Program is responsible for the 23 ships, primarily tankers and dry cargo ships, that move DoD cargo in peace time and war, the chartering of additional cargo space if needed, and the activation of the eight FSS and the 94 RRF ships.[38]

The large DoD investment in ships for sealift marks a change in its traditional role with the commercial shipping world. DoD previously relied on the commercial sector for both surge and sustainment lift. DoD now has procured its own surge capability, but will still rely on the commercial sector for sustainment.[39] In order to make commercial shipping more accessible to DoD, Congress passed the Maritime Security Program which authorized the retaining of 47 ships for $2.1 million each. Each ship receiving the subsidy is required to fly the U.S. flag and hire U.S. mariners. Additionally, the ship operating companies make their entire intermodal systems available to the government.[40]

Navy Activity in Sealift

The Navy has recognized its responsibility to improving sealift. Sealift is one of its five core competencies. It is specifically called out in the ***From the Sea*** doctrine.[41] The Navy created a branch in the office of the Deputy Chief of Naval Operations (Logistics) which was tasked with developing assets that could serve as interim sources of sea lift until the U.S. flag Merchant Marine could be revitalized.[42] Significant amounts of money have been invested in improving strategic sea lift. The Navy spent approximately $7.4 billion on strategic sealift over a ten year period, over six billion dollars just for the LMSR program.[43]

The Navy has looked at the potential for high speed sea lift. In 1989 the Navy concluded that a high speed surface craft would be too costly to develop and the financial risk too great. In 1996 a Joint Staff initiative resurrected the high speed sea lift concept and sponsored a study which concluded that a high speed surface ship was an achievable goal.[44]

Although clearly sealift is garnering more attention and funds, the MSC is not moving in the direction of new technologies. Their budget is relatively low and incapable of supporting a large R&D effort such as the fast sealift ship envisioned by the AAN. Their purchases are geared toward more traditional merchant vessels and they are closely tied to the commercial shipping sector which is conservative by nature.

USTRANSCOM, MSC's parent command, is sponsoring some of the efforts to investigate radical improvements in the way U.S. forces deploy. This sponsorship extends to the Center for the Commercial Development of Transportation Technology (CCDOTT), a consortium of commercial firms and academia chartered to develop commercially viable technologies that are also useful for faster military deployment. The CCDOTT has a five year plan to field a high speed, commercially viable, militarily useful ship.[45]

Current state of the art high speed ships are primarily passenger and vehicle ferries designed for relatively short distances in fairly well protected marine environments. The industry projects that a catamaran type hull with infusions of technology currently available can be built with 200,000 square feet of deck area, which can load and unload in four hours, carry approximately 2,000 tons, and can travel 3,500 miles at speeds of 60 knots in a state six sea. With lightweight composites and improved technology, the industry predicts a payload of 5,000 tons, a speed of 100 knots in most sea states and a range of 8,000 miles.[46] No prototypes have been built. Two shipbuilders in a recent meeting regarding high speed ship technologies claim they could begin building militarily useful vessels now. One shipbuilder's design calls for a surface effect vehicle that can travel at 55 knots and can carry a payload of 1,800 tons over a distance of 8,700 miles.[47] Another builder's design projects a 700 foot long ship that will travel at 50 knots of speed with a payload of 20,000 tons of cargo at a range of 7,000 nautical miles.[48] All of these ideas are still in the conceptual phase.

ENHANCING PREPOSITIONED ASSETS

Prepositioning assets overseas is the other area that is garnering considerable investment in the sealift arena. Desert Storm vindicated the Marine's prepositioning investments. The pre-positioned assets of the U.S. Marines in Diego Garcia were the most responsive sealift assets for the first 30 days of the Operation Desert Shield. The ships arrived on station in seven days after receiving sailing orders. The forward-deployed ships allowed the Marine Expeditionary Unit to be fully outfitted and self-sustaining within 18 days.[49] The ships were part of a Marine program that began in the late 1980's. The success of the program led the Army to develop its own prepositioned sealift capability.

The Prepositioning Program today has expanded considerably since Desert Storm. There are 31 ships loaded with equipment for all the services in various locations throughout the world.[50] The majority of the ships are located at Diego Garcia or Guam and Saipan. Several of the new LMSRs will be used to replace existing vessels or enhance the assets that are already there. The Marines have 13 roll-on/roll-off (RO/RO) ships in their prepositioned inventory segregated into three separate squadrons (MPSRONs). Each squadron contains enough material to outfit a 17,000 man Marine Corps Air Ground Task Force (MAGTF) for 30 days. The squadrons are each commanded by a Navy Captain and are manned by U.S. merchant mariners. The ships are leased under a long-term commercial agreement.[51] Combat readiness is complete within ten days of arrival at the port of debarkation. Once the equipment is married to the personnel, the CINC has at his disposal a brigade sized task force that is self-sustaining for 30 days.[52]

The Army Prepositioned Afloat (APA) assets number 13 ships with several different ship types. The Army operates the APA assets as a single unit split between Diego Garcia and Guam/Saipan. The ships carry enough equipment to outfit a mechanized or armored brigade for 15 days or a three division light contingency corps for 30 days.[53] The APA supports a brigade of approximately 9,300 personnel. The APA is designed to provide the first material support in case of a major ground campaign in either Korea or Southwest Asia. The goal is to have a brigade combat ready within 15 days of a deployment order. This assumes the availability of a deep water port to offload the equipment in eight days.[54] The APA allows the CINC to insert heavy forces early in a contingency.

The Marine Corps has already started developing new concepts for the prepositioning force at its Marine Corps Combat Development Center (MCCDC). The new concepts, known as MPF 2010 are based on four foundations: force closure, amphibious task force integration, indefinite sustainment and in-theater reconstitution and redeployment. Without going into any depth regarding the concepts, MPF 2010 calls for Marine units to arrive on the platforms en route to the area of conflict, immediately ready for projection ashore. Access to secure airports and ports would not be necessary.[55] The prepositioned forces would serve as a sea-based platform for logistics support instead of having to establish a beach head and create a logistics capability on shore.[56] MPF 2010 will require some significant enhancements to the capabilities that currently exist, not the least of which is increased speed for the prepositioned ships. This represents a shift from the platforms as forward deployed assets to platforms from which to project power.

The Army has not outlined a plan for the future role of their prepositioned ships, but is expanding its prepositioned capabilities by replacing seven RO/ROs with eight LMSRs, more than doubling the amount of cargo space available.[57]

The costs of prepositioning are significant and at some point there are diminishing returns to increasing the amount of prepositioning. Additionally, the relatively few locations and significant amount of time spent in port or at anchorage for both the Army and the Marine prepositioned ships makes them vulnerable to attack from a determined enemy.

POTENTIAL SOLUTIONS TO THE FAST LIFT PROBLEM

The Army After Next is a tremendous concept. Rapid sea lift is one of the linchpins of the AAN's concept of force projection. It is an integral part of the smaller, lethal, rapid response force that the Army envisions. The problem becomes how to achieve the vision of rapid force projection in the most effective manner. The following paragraphs will review some of the issues related to faster strategic lift.

Invest in Faster Ships

The investment for rapid sealift needs to be made within a window of the next five years if the vision is to be realized by the year 2025. The length of time to conduct research, development and testing is significant. This is a radical shift in marine technology which would not only require new hull construction but new power plant construction as well. The cost involved in breaking the maritime paradigm and moving to these new concepts would probably be high and would require more money than the DoD is willing to commit. The shipbuilding industry seems interested in initiating a program that could help to revitalize their sagging fortunes since the decline of the DoD budgets following the end of the Cold War. They will look for substantial government help in funding the research and development.

The shipping industry seems lukewarm to the idea of faster shipping platforms and is unlikely to help fund any research in that arena. The Navy is not strongly interested in this project. Applying scarce resources to this issue is unlikely given that the fast ship technology is somewhat risky and the Navy has other pressing funding needs. The concept has not been validated by the JROC. An "approved requirement" or a documented Mission Statement for high speed sea lift would assist in moving the project forward.

The issue is whether the cost to develop the capability provided by high speed sea lift is warranted. Evaluated against other alternatives, the capabilities provided in terms of range, payload and speed may not justify the costs.[58] According to Mr. Coleen Kennell, an engineer with the Naval Weapons Center Carderock, MD and someone who has written extensively on the subject of high speed sealift, a limited high speed ship with 1,000 tons cargo capability, 42 knots of speed and 3,000 miles of range is economically feasible. There is even potential for a ship with a 4,000 to 5,000 ton payload that would cost in the hundreds of millions. Pushing the speed and range envelope beyond those parameters, however would dramatically increase costs.[59]

The Naval Sea Systems Command (NAVSEA) review of the high speed sea lift program in 1989, concluded that the research and development and full scale prototyping of a technology demonstrator would drive the costs into the billions of dollars.[60] Such high development costs borne solely by the government would be difficult to rationalize.

Invest In More Aircraft

Investing in significantly more strategic lift aircraft is not a likely option. Even though 14 more aircraft have been recently authorized, the current DoD budget already calls for the expenditure of $16 billion of the $22 billion earmarked for strategic lift for the years 1998-2002 for the C-17.[61] The budget could not sustain the costs of purchasing many more C-17s than those already in the pipeline at $180 million a piece.[62] Even if DoD were willing to buy more transport aircraft, cargo planes cannot carry enough heavy material to support the Army as it is currently configured.

New airship designs on the horizon may provide the most promise for additional airlift capability. There are some promising new technologies in a hybrid airplane/airship design that may be on the near horizon. The Lockheed skunkworks is promoting a new air vehicle that would fly at 120 knots and carry cargoes similar to the largest merchant ships. The cost per pound to deliver products on such a vehicle are estimated to be just slightly more than a conventional merchant ship ($.30/lb versus $.20/lb).[63]

There are a tremendous number of commercial air cargo assets in the commercial shipping inventory. Unfortunately many of the Army's heaviest pieces of equipment cannot fit on commercial planes. In a crisis situation the Civil Reserve Air Fleet (CRAF) could be mobilized under the jurisdiction of the Air Mobility Command. The CRAF has only been mobilized once in its existence, during Operation Desert Storm.[64] The tremendous expenses of using air assets, no matter where their origin, makes it unlikely that air lift alone can provide the capabilities required by the AAN.

Enhance Prepositioned Assets

Although pre-positioned assets may not arrive within 72-120 hours, depending on their location, they may arrive within acceptable time frames. The ships from Diego Garcia arrived in the Southwest Asian theater within a week during Desert Storm. The ships at Guam and Saipan would take as long as two weeks to reach Southwest Asia, but they are a week or less from most of the potential trouble spots in the Pacific Rim. Adding more pre-positioned assets to both sites would allow the Army to field a larger contingent immediately at either of the two most troublesome areas in the world. The Army would not arrive with the speed that it desires, but perhaps it could live with 168 versus the 120 hours it is currently seeking. Pre-positioning more assets is an expensive option. The Army's pre-positioned fleet costs $60,000-$70,000 a day to operate.[65] The estimated prepositioning budget for the next five years including the land-based assets is approximately $300 million a year.[66] Entire sets of weapons are taken out of the hands of soldiers and placed in large floating warehouses. Pre-positioned ships have been filled with the excess arms from the draw down of forces in Europe. These excesses will not continue indefinitely. The weapon's systems that are on board will need to be updated and modernized over time. That will be an added expense. However, even given the expenses of prepositioning, the annual budget is less than one half the operations and maintenance cost of the C-17.[67]

Continue Current Course

Continuing the current investment strategy is a potential option. An argument can be made that DoD is already investing adequate and realistic amounts in sealift and that expectations of a significantly faster sea lift platform are unrealistic. By the year 2002 sealift capacity will be doubled once all the LMSRs are operating. Sealift capabilities are targeted to meet over 95% of the requirement. There will be approximately 40 prepositioned ships and 80 surge ships that will be available for sustainment or follow-on surge.[68] The issue will not be with sufficiency, but with speed. The prepositioned ships will be on station for delivery within a two week window. Unless there is a radical change in the technology for ocean going vessels that provides for speed and lift at an economic cost, the Army may not have much choice but to accept the status quo: initial loads ferried by C-17s with surge and sustainment loads brought by prepositioned and sealift assets.

CONCLUSION

The vision for the Army After Next regarding the speed of arrival and sustained deployment will not be achievable by the year 2025 through sealift. A radical shift in maritime technology may occur within the next 30 years to allow sea-going platforms to enjoy much higher speeds and carry comparable cargoes as today's ocean going vessels. Such technology does not appear imminent at a price that the DoD or the Army could afford. The AAN should not assume that the capability will be there. The propulsion versus speed versus payload problem is not solvable with current power sources. There does not seem to be enough interest in the commercial shipping sector to investigate or fund any research into new technologies. The dollar cost of incremental increases in speed has proven to be economically unfeasible for large commercial cargoes. The eight fast sealift ships are in the MSC inventory because they could not be operated profitably by the commercial sector. They are capable of speeds up to 34 knots which is only an incremental improvement in speed, not the significant leap that the Army is looking for.

The DoD budget environment will not allow for a large investment in sealift research. R&D costs for such an effort would be significant. No service is willing to expend precious resources on untested technology. The airlift technology may be closer to realization with some form of dirigible that can haul a large load and may be the complete answer the Army needs for future lift. Unless there is some commercial interest in a large airship and the private sector is willing to make the investment in infrastructure, this is not an area that is likely to succeed either.

Prepositioning appears to offer the most effective solution for the rapid movement of material to a front. An enhanced prepositioning effort may not meet all of the AAN requirements, but it could come close. The Marine Corps MPF 2010 could serve as a model for Army planners. It can provide an interim approach until the appearance of a radical new technology that will allow the Army to move its heavy equipment without the constraints of currently understood physics.

The AAN is still in the concept stage. It will undoubtedly change as time progresses and some of its assumptions prove to be inaccurate or the pace of change is greater than is predicted. At this time the assumption that fast sealift will be available by the year 2025 appears very unlikely.

Word Count = 6,819

ENDNOTES

[1] The ideas in this paragraph are based on remarks made by COL Dan Burgoine speaking to the Army After Next Class on 5 January 1999

[2] Paul Bracken, "The Military After Next," The Washington Quarterly (Autumn 1993): 169.

[3] Alvin and Heidi Tofler provide a model for understanding the development of civilization in their book, War and Anti War, based on three "waves" of civilization. The first wave was characterized by man's abandoning the hunter-gatherer existence for agriculture as a primary means of sustenance. The second wave was the industrial revolution. The third wave is the information revolution. Not all areas of the world have experienced the waves concurrently nor are they necessarily sequential. Each "wave" produces a different form of warfare which a modern army must be ready to confront.

[4] The White House, A National Security Strategy for a New Century, October 1998, 1.

[5] Department of the Army, "Knowledge and Speed," The Annual Report on the Army After Next Project to the Chief of Staff of the Army, July 1997, Available from <http:/www.monroe.army.mil/dcsdoc/tbdaan/aanframe.htm>; Internet; accessed 11 January 1998, 12.

[6] Ditto, 18.

[7] William Crowder et al "Applying Technology to Achieve the Vision of the Army After Next," Technology and Power Projection for the Army After Next, November 1997; Available from <http://198.3.128.48/~hss/index.htm>; Internet; accessed 11 August 1998, 4.

[8] LT Stephen P. Ferris, USNR, "Crisis in Strategic Sealift," Army Logistician, March-April 1996, 28.

[9] Robert W. Kesteloot, "Strategic Sealift Faces Its Third Challenge," Sea Power, May 1997, 48.

[10] James K. Matthews and Cora J. Holt, So Many, So Much, So Far, So Fast (Joint History Office, Office of the Chairman of the Joint Chiefs of Staff and Research Center, United States Transportation Command., 1996) 115.

[12] James D. Hessman and Marcia Smith interviewing Acting Maritime Administrator John E. Graykowski, "Filling the Critical Need for Sealift", Sea Power, September 1997, 19.

[12] LCDR Carl T. Bright and LCDR Sharon R. Hale, "Strategic Sealift for Desert Shield, Not a Blue Print for the Future", Research Paper, Naval War College, Newport RI, 21 June 1991, 23.

[13] "Allied Merchant Shipping Losses in World War II," available from http://www.cableregina.com/users/shipwreck/index7.htm; Internet, accessed 7 March 1999.

[14] Robert W. Kesteloot, "U.S. - Flag Fleet Faces Major Problems," Sea Power, May 1998, 34.

[15] LCDR Sean Connaughton, USNR, "Reinventing Sealift," Proceedings, December 1997, 60.

[16] David G. Harris and Richard D. Stewart, "U.S. Surge Sealift Capabilities: A Question of Sufficiency", Parameters (Spring 1998): 80.

[17] Ibid., 71.

[18] Connaughton, 59

[19] Harris and Stewart., 73

[20] The Annual Report on The Army After Next Project to the Chief of Staff of the Army, 1.

[21] William Crowder et al, 1.

[22] The Annual Report on the Army After Next Project to the Chief of Staff of the Army, A-7.

[23] Heike Hasenauer, Wargaming: The Army After Next," Soldiers, December 1997, 34

[24] Colen Kennell, "Design Trends in High Speed Transport," Marine Technology, July 1998, 127

[25] Military Sealift Command Prepositioning Program Briefing, November 1998, p. 20

[26] Colen Kennell., 140, Table 1 Results for Near Term Technology

[27] Ibid., 141, Figure 6. Predicted Impact of Technology on Ship Performane

[28] Army After Next, Lightening the Force Panel, "Lighten the Force - Technology and Army Material Development," Land Power Essay Series, November 1997; available from http://193.3.128.48/~hss/index.htm; Internet, accessed 11 August 1998, 5.

[29] Hasenauer, 34

[30] Army After Next, Lightening the Force Panel, 5.

[31] The Congress of the United States, Congressional Budget Office, Moving U.S. Forces: Options for Strategic Mobility, February 1997, Appendix A, p. 2, available from http://www.cbo.gov/showdoc.cfm?index=11 accessed 14 January 1999.

[32] Robert W. Kesteloot, May 1997, 47

[33] Norman Williams, "The Revolution In Military Logistics," Military Technology, November 97, 57

[34] Department of the Army, "Knowledge and Speed," The Annual Report on the Army After Next Project to the Chief of Staff of the Army, July 1997, 18

[35] Denny Edwards, "Military Sealift Command," Defense Transportation Journal, February 1998, 24

[36] Ibid., 24

[37] Ibid., 25

[38] Ibid., 25

[39] The Congress of the United States, Congressional Budget Office, Moving U.S. Forces: Options for Strategic Mobility, February 1997, Chapter 3, 1.

[40] Robert W. Kesteloot, May 1998, 34.

[41] Department of the Navy, From the Sea, Preparing the Naval Service for the 21st Century, Navy and Marine Corps White Paper, September 1992, 4.

[42] Robert W. Kesteloot, May 1997, 48.

[43] James K. Matthews and Cora J. Holt, 115.

[44] William Crowder et al, 11.

[45] Ibid., 10

[46] Ibid., 11

[47] Army After Next Move Faster Panel, "Move Faster - Strategic Mobility in the 21st Century," Land Power Essay Series, November 1997; available from http://193.3.128.48/~hss/index.htm, Internet; accessed 11 August 1998, 5.

[48] Ibid., 5.

[49] LCDR Carl T. Bright and LCDR Sharon R. Hale, 22.

[50] Denny Edwards, 12.

[51] LtCol Michael Kampsen, "Army and Marine Corps Afloat Prepositioning: Providing Full Spectrum Capability Through Complementary Programs," U.S. Army War College Research Paper, Carlisle, PA, June 9, 1998, 9.

[52] Ibid, 10.

[53] Ibid, 12.

[54] Ibid, 12.

[55] Ibid, 21.

[56] Ibid, 21.

[57] The Congress of the United States, Congressional Budget Office, Summary, 4.

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[59] Colen Kennell <Kennell_Colen@hq.navsea.navy.mil>, "High Speed Sealift," electronic mail message to CDR James P. Naber naberj@awc.carlisle.army.mil, 21 January 1999.

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[61] The Congress of the United States, Congressional Budget Office, 2.

[62] "C-17 Fact Sheet," Available from WWW.AF.MIL/NEW/FACTSHEETS/C 17 GLOBEMASTEER III.HTML, Internet accessed 7 January 1999

[63] These figures were presented by LTG J.M. McDuffie in his 12 January 1999 lecture on Joint Theater Logistics to the Army War College.

[64] Denny Edwards, 24.

[65] LTC William W. Curl, "The Army Preposition Program: Is It a Program We Need?", U.S. Army War College Research Paper, July 8, 1998, 13.

[67] The Congress of the United States, Congressional Budget Office, Summary Table 1, 2.

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[69] Jonathon D. Kaskin, 16 October 98.

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