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MASTER OF MILITARY STUDIES

**SUSTAINING THE SINGLE NAVAL BATTLE:
ENHANCING USMC EXPEDITIONARY LOGISTICS WITH THE ADDITION OF THE
MARITIME PREPOSITIONING FORCE (MPF) AUXILIARY DRY CARGO /
AMMUNITION SHIPS (T-AKES)**

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14. ABSTRACT The selective employment of the MPF T-AKES to provide sea-based sustainment for amphibious operations is one way for the Department of the Navy (DoN) to address the shift in the national military strategy towards the Asia Pacific Region while optimizing the amount of forward positioned equipment and supplies afloat. This would be taking a big step towards operationalizing the MPF for steady-state requirements and shattering the "break glass in time of war" perception of the MPF. Beginning in July 2012 the DoN will incorporate the first of two T-AKES into the Marine Corps prepositioning program. The T-AKES will contribute to the prepositioning of Marine Expeditionary Brigades by providing selectively offloadable sea-based sustainment to forces afloat and ashore. The ships' ability to distribute and restock underway brings a new capability to the MPF which should also be employed to augment the concept of sustainment for amphibious operations. By incorporating the T-AKE into amphibious operations the DoN could relieve some pressure from the task saturated / over-embarked amphibious fleet and further justify the utility of the MPF.					
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Executive Summary

Title: Sustaining The Single Naval Battle: Enhancing USMC Expeditionary Logistics with the addition of the Maritime Prepositioning Force (MPF) Auxiliary Dry Cargo / Ammunition Ships (T-AKEs)

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Thesis: The selective employment of the MPF T-AKEs to provide sea-based sustainment for amphibious operations may be one way for the Department of the Navy to address the evolving global security environment, optimize the amount of forward positioned supplies afloat, and increase the relevance of the MPF in steady state operations through more frequent employment as part of the Single Naval Battle.

Discussion: Beginning in July 2012 the Department of the Navy (DoN) will incorporate the first of two T-AKEs into the United States Marine Corps prepositioning program. The T-AKEs will provide immediate benefit by contributing to the prepositioning of a Marine Expeditionary Brigades and providing sea-based sustainment via tailorable, unitized packages to forces afloat and ashore. The ships' ability to distribute and restock via palletized loads brings a new and unique capability to the MPF. This capability could also be employed, given the proper scenario, to augment the concept of sustainment for amphibious operations without assuming significant risk to the prepositioning mission. Recent strategic guidance has highlighted a shift in focus towards the Asia Pacific region which puts an even higher premium on capabilities such as those resident in amphibious Marine Air Ground Task Forces (MAGTFs). However, the task saturated amphibious fleet lacks the number of platforms to fulfill the demand of the Geographic Combatant Commanders (GCCs) and --with the growth of the MAGTF's embarkation requirements—is unable to load all the equipment and supplies the MAGTF Commanders would like to take on deployments. By incorporating the T-AKE into amphibious operations the DoN would be taking a step towards operationalizing the MPF for steady-state requirements, shattering the “break glass in time of war” perception of the MPF, and further developing a Single Naval Battle Concept that would relieve some of the embarkation pressures on the strained amphibious fleet while incorporating all DoN assets across the maritime domain to satisfy the needs of the GCCs.

Conclusion: The MPF T-AKEs are not the panacea of expeditionary logistics. Rather they provide the GCC's another sustainment option across the breadth of naval capabilities at their disposal. The GCC demand for Amphibious forces exceeds the capacity of the current number of amphibious ships and is trending upwards. The T-AKE—while far from a replacement for amphibious shipping—offers an opportunity to do things differently, rather than continuing with the status quo and simply accepting a reduced expeditionary capacity afloat.

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Preface

As a Midshipman at the U.S. Merchant Marine Academy I spent a portion of my education aboard the Department of the Navy's Military Sealift Command ships conducting the repositioning mission for the Department of Defense (DoD). Since those days my view of the repositioning programs has shifted from provider to that of the customer by serving as a Logistician on a Marine Expeditionary Unit staff and later as the Maritime Repositioning Force (MPF) Officer for the U.S. Marine Corps, Deputy Commandant for Plans, Policies and Operations. Throughout my collective experiences I've wrestled with the idea of how the DoD could get the most out of this strategic program.

While conducting research for this paper I came across the integrating approach of "Single Naval Battle" which took this research project in a whole new direction. The Single Naval Battle perspective highlights the goodness of fusing the, what at times seem like separate, Naval capabilities into a single cohesive Naval Expeditionary System. An opportunity to leverage the distinct yet complementary capabilities of the amphibious and repositioning programs to contribute to the Single Naval Battle is on the horizon with the introduction of the MPF T-AKEs. This paper is an attempt to help get the word out.

I'd like to acknowledge the following organizations for their assistance with my research and contributions to this paper as a whole: Military Sealift Command, DC I&L(LPX), DC PP&O(POE), DC CD&I(SID), MCCDC (Ellis Group, EWCT, MCWL), DLA(J3/5), OPNAV (N85), Command Officer MCCSSS, VMM-266, the Captain and Crew of USNS *Robert Peary*, (T-AKE 5) and my wife for her patience and sanity checks as required.

INTRODUCTION

In this era of relative fiscal austerity, the Department of the Navy (DoN) must make best use of its limited resources to prepare for future security challenges. Strategists anticipate that potential adversaries will adopt antiaccess and area-denial (A2/AD) strategies that will deny the United States military the opportunity to establish large forward supply bases ashore. The enemy strategy is expected to include a large scale defense in depth that employs a combination of long range weapon systems, designed to prevent entry into the operational area, and short range weapons, designed to limit the freedom of movement in the operational area, if such access is gained. The change in adversary tactics calls into question the effectiveness of the aforementioned standard practice of creating a static onshore military presence in the operational area, and may highlight the need and utility of sea-based logistics.¹

At present there is no relief in sight to the continued shortfall in amphibious shipping required to satisfy the DoN's operational requirements to embark and transport Marines. (See Figure 1) Furthermore, the Geographic Combatant Commanders' (GCCs') demand for amphibious Marine Air Ground Task Forces (MAGTFs) exceeds the DoN's current capacity, and is trending upwards—from 10 overseas deployed amphibious ships in 2007 to 18 in 2010.² Further complicating the shortage of amphibious shipping problem is the reality that the embarkation footprint of the Marine Corps' MAGTFs has grown larger over the past decade of ground based combat in Iraq and Afghanistan— in other words, there is more equipment and general cargo but an insufficient number of ships. A solution is required to relieve some of the pressure being felt by the limited embarkation space available on the task saturated amphibious fleet.

As part of the DoD's most recent round of budget cuts, the DoN is planning to reduce the Maritime Prepositioning Force (MPF) from three to two Maritime Prepositioning Ship Squadrons (MPSRONs) beginning in fiscal year 2013.³ This will concurrently reduce the Marine Corps' capability to rapidly deploy a MAGTF anywhere in the world in support of the National Military Strategy; continued support for the remaining vital capabilities inherent in the MPF program is essential to the overall warfighting readiness of the Marine Corps.⁴ The elimination of the MPSRON can be partially attributed to the perception of many that the MPF is an expensive "floating warehouse" and a break-glass-in-time-of-war capability not suitable for steady state operations.⁵ With the potential for even deeper cuts to the defense budget on the horizon all programs must continue to prove their relevancy, for the MPF this means expanding its utility to steady state operations.

Therefore, to address the three issues outlined above, this thesis proposes that the selective employment of the MPF Auxiliary Dry Cargo/Ammunition Ships (T-AKES) to provide sea-based sustainment for amphibious operations may be one way for the DoN to address the evolving global security environment, optimize the amount of forward positioned supplies afloat, and increase the relevance of the MPF in steady state operations through more frequent employment as part of the Single Naval Battle (see below). This paper will show that the value of the MPF T-AKE should not only be measured against its ability to contribute to the prepositioning of a Marine Expeditionary Brigade, but also its potential to contribute to sustaining amphibious operations as one part of the whole Naval Expeditionary System.

BACKGROUND

Single Naval Battle

The Single Naval Battle represents a new integrated direction for global naval operations to combat the dynamic security threats around the world. In September 2011, the Assistant Commandant of the Marine Corps directed the temporary establishment of the Amphibious Capabilities Working Group (ACWG) to conduct a review of the emerging security environment, strategic constructs, operational concepts, and amphibious capabilities in addition to providing a validated framework for future naval amphibious capabilities.⁶ During this review the ACWG recognized a need for a “unifying perspective for naval operations that envisions the maritime and littoral domains as an indivisible whole, through which an integrated multi-domain naval force can seamlessly achieve sea control and power projection effects,” and thus the concept of the Single Naval Battle was born.⁷ The theory of uniting naval operations involves removing the seams between the separate naval capabilities and organizations (e.g., Surface Warfare, Subsurface Warfare, Combat Logistics Force, and embarked Marines) to enable a more cohesive application of naval power. By opening these compartmented communities, Single Naval Battle advocates the creation of operational concepts, doctrine and plans using a naval combined arms approach. The idea is akin to the *Marine Corps Operations* definition of the Single-Battle Concept-- “a unifying perspective of operations, which holds that actions anywhere in the operational environment can affect actions elsewhere.”⁸ In addition, the Single Naval Battle proposes a *gestalt* to military operations, that is, the value of the individual parts should be measured against their value towards the whole Naval Expeditionary System and that the value of this system is greater than the sum of the individual parts.⁹ (Figure 2 gives a graphic representation of Single Naval Battle)

The integrated approach to sustain naval forces across the maritime and littoral domains to mitigate A2/AD challenges, along with the importance of the MPF program and the role of Amphibious Operations in naval battle, provide the framework for this thesis. Documenting the entire history of the MPF and providing detailed concepts for sustaining Amphibious Operations is beyond the scope of this paper. However, before moving the discussion forward a brief overview of the MPF program and documenting current logistic sustainment in support of amphibious operations is important to the context of this paper.

The Maritime Prepositioning Force (MPF)

The mandate issued by the 82nd Congress in 1952 for the Marine Corps to be “the most ready when the Nation is...least ready” has been a theme that resonates behind concepts such as forward prepositioning equipment and supplies aboard government contracted ships in strategic locations around the globe.¹⁰ From 1980 to 1987 the Marine Corps created what is now known as the MPF program to improve its ability to rapidly support operations in forward areas.¹¹ The Maritime Prepositioning Ships (MPS) of the MPF are currently organized into three Maritime Prepositioning Ship Squadrons (MPSRONs). The MPSRONs are operated by civilian Merchant Mariners (CIVMARs), under the administrative control (ADCON) of Military Sealift Command and assigned to the GCCs in the Secretary of Defense’s (SECDEF’s) Global Force Implementation Guidance (GFMIG).¹² Each MPSRON carries the majority of equipment and supplies required to support a Marine Expeditionary Brigade (MEB) for 30 days.¹³ While the MPS are assigned to the GCCs the “cargo, equipment, and capabilities” are unassigned, ADCON to the Marine Corps and considered a title 10 United States Code service responsibility.¹⁴ This means that the GCCs maintain Combatant Command authority of the ships assigned to them but not the cargo and equipment. A full MEB capability is realized when the equipment and

supplies loaded on the MPSRONs are married up with the fly-in echelon and the self-deploying aircraft of the MEB's aviation combat element.* The three MPSRONs are currently strategically located as depicted in Figure 3 however, "in fiscal year 2013, the DoN plans to eliminate one of these squadrons as an [fiscal] efficiency measure."¹⁵

As with all military capabilities, the prepositioning programs must continue to evolve to remain relevant. The MPF(Future) (MPF(F)) program will enhance the Marine Corps' afloat prepositioning program from a deployment option to an employment option that provides the GCC with the ability to close, assemble, employ, sustain, and reconstitute up to a MEB sized force at sea.¹⁶ The MPF(F) program will be comprised of aviation platforms, Mobile Landing Platforms (MLP), Large Medium Speed Roll-on/Roll-off (Future) (LMSR(F)) ships, T-AKEs and a portion of the Auxiliary Cargo ships (T-AK) that make up the MPF today.¹⁷ A significant milestone in realizing the desired MPF(F) capability is the addition of T-AKEs to the MPF. However, prior to introducing the T-AKEs, understanding the current methods of amphibious logistics is warranted.

Amphibious Logistics

Currently sustaining the landing force embarked, or deployed from, amphibious ships is conducted using one or a combination of four general methods: embarked aboard amphibious ships, through the use of the Assault Follow-on Echelon (AFOE), provide via contracted logistics for delivery ashore, or through Naval Logistics Integration (NLI) which is similar to the method proposed by this paper. Each method is utilized for a specific purpose.

* **Fly-in echelon**-Airlifted forces and equipment of the Marine air-ground task force and Navy support element plus aircraft and personnel arriving in the flight ferry of the aviation combat element. Also called FIE. (MCRP 5-12C)

Sustainment can be embarked aboard amphibious ships in the form of Landing Force Operational Reserve Material (LFORM) or stowed in general cargo spaces. “The LFORM is a package of contingency supplies pre-positioned on amphibious warfare ships consisting of Class I (Rations), Class III (bulk and packaged ground petroleum, oils and lubricants (POL)), Class IV (field fortification/construction material), Class V(W) (ground ammunition), and Class V(A) (aviation ammunition, mission load allowance (MLA)).”¹⁸ It is designed to support a notional Marine Expeditionary Unit (MEU) sized force with 15 days of sustainment for the above mentioned classes of supply. The LHA-1 (*Tarawa*), LHD-1 (*Wasp*), LPD-4 (*Austin*) and LPD-17 (*San Antonio*) classes of amphibious ships are currently the LFORM carriers; however, the LSD (CV) (*Harpers Ferry*) design does support the loading of LFORM.¹⁹ The matrix in Appendix A is derived from the most current LFORM Order. Sustainment that is required and embarked—not as part of LFORM—is typically stored in containers such as Quadcons which consume a portion of the limited amount of square footage that is available to stow rolling stock. Figure 4 uses a recent MEU embarkation plan to illustrate the large number of Quadcons and other miscellaneous cargo commonly stowed on vehicle and flight decks.

Another option for sustainment is through the AFOE. The AFOE is defined as “that echelon of the assault troops, vehicles, aircraft, equipment, and supplies that, though not needed to initiate the assault, is required to support and sustain the assault. In order to accomplish its purpose, the AFOE is normally required in the objective area no later than five days after commencement of the assault landing.”²⁰ It should be noted that the MPSRONs are not doctrinally considered part of the AFOE and thus T-AKEs should not be considered to offset the total AFOE requirement for follow-on shipping to support the assault echelon of an amphibious

assault. The AFOE is embarked primarily in strategic sealift shipping or aircraft.²¹ However, further study is required to determine what risks—that would otherwise be unacceptable—could be mitigated by allowing the amphibious MAGTFs to leave some equipment and supplies off the Amphibious embark plan with relative assurance that they would be available when required from the MPF T-AKE and later be backfilled as required by the AFOE.*

Sustainment can also be purchased through DoD hired contractors or organizations such as the Defense Logistics Agency (DLA). Using this method, sustainment for the landing force is delivered to a permissive location ashore (or in combination with the NLI method described next) to allow for a link up with the amphibious forces when they debark. This method is often used for fiscal reasons and to economize the limited embarkation space aboard amphibious shipping however the lack of a permissive environment or access to the infrastructure (e.g., ports, airfields etc.) may make this option less appealing and effective (i.e. in an A2/AD environment).

The final method, NLI, is an ongoing initiative to integrate naval logistics capabilities that can operate seamlessly afloat or ashore, successfully supporting and sustaining operating units in a joint warfighting environment.²² This method allows the landing force to utilize the Navy's infrastructure to manage its sustainment requirements and is often delivered to MEUs afloat by Combat Logistics Force (CLF) T-AKEs that are supporting the Amphibious Ready Group.†

* It is important to note that any AFOE requirement that is “borrowed forward” from an MPF T-AKE would still need to be backfilled from the actual AFOE sailing from CONUS. Otherwise cargo coming off the MPF T-AKE would be double counted by the AE and MPF MEBs and the aggregated MPF / Amphibious force would end up being short sustainment in the end.

† The CLF fleet, also operated by Military Sealift Command, resupplies the Navy's combatant ships at sea. This enables the combatant fleet to remain at sea vice having to go to ports to resupply with food, fuel, ammunition, and other supplies. There are currently 10 *Lewis and Clark* class T-AKEs operating as part of the CLF with the expected amount to total 14 to include those slated to be part of the MPF. Source: http://www.navy.mil/Search/display.asp?story_id=59810

Although the NLI method is similar to the method purposed herein, the CLF T-AKEs used to support the MEUs today are only used as means to transport a MEU initiated requisition, or in some circumstances (if they happen to be in the Navy supply system aboard the CLF T-AKEs) the MEUs may draw from the CLF stocks for items they require. It should be noted that the use of ship's husbanding agents are another major pillar of NLI but can be assumed to be met with the same limitations as the contracting method mentioned above.

Each one of the above methods has advantages and is optimal for specific situations; however, the MPF T-AKEs provide some alternate sustainment options for the GCCs. Analysis on a case-by-case basis is required for making the informed decision of when to utilize an MPF T-AKE in combination, or in lieu of the methods of sustaining the amphibious force described above. Before describing how this analysis may be conducted the following section of the paper will provide the framework for understanding how the MPF T-AKEs came into existence and their original role.

T-AKEs

The path of delivery for the MPF T-AKEs has taken many turns over the last several years. In March of 2008, the Vice Chairman of the Joint Chiefs of Staff and the Joint Requirements Oversight Council (JROC) approved the MPF(F) Increment One Capability Development Document (CDD) which directed the Department of the Navy to incorporate the MPF(F) T-AKEs into Long Range Shipbuilding Strategy.²³ The MPF(F) Increment One, CDD also defined the performance attributes of the three T-AKEs in the MPF(F) program of record that were designed to provide the majority of the sustainment for a seabased MEB. The T-AKE's planned delivery prior to the 2017 MPF(F) Initial Operational Capability was anticipated to provide an immediate seabased persistent sustainment capability for forces operating ashore, while the

remaining elements of the MPF(F) squadron were to be built and delivered. However, as part of the 2010 Quadrennial Defense Review and as part of the process of completing DoD's budget submission for fiscal year 2010, the Secretary of Defense deferred production of new maritime prepositioning ships (outside of the T-AKEs) so that more pressing fiscal needs could be addressed.²⁴ In May 2011, the Marine Corps agreed to accept three T-AKEs that are currently in service as part of the CLF (T-AKEs 1, 2 and 3) vice the planned new construction T-AKEs 12, 13 and 14 to realize, what is forecasted to be, an overall fuel cost savings to the Department of the Navy.²⁵ In February 2012, the Presidential Budget for fiscal year 2013 made yet another change by reducing the number of T-AKEs being delivered to the MPF program in a Full Operating Status from three to two—to correspond to the remaining number of MPSRON's in full operating status.²⁶ Appendix B provides a general overview of the characteristics and capabilities of the two T-AKEs being introduced to the MPF and the following section will explain their concept of employment.

The Current MPF-TAKE Concept of Employment

Following the Secretary of Defense's deferment of the MPF(F), in March of 2010, Headquarters Marine Corps (HQMC) and the Office of the Chief of Naval Operations (OPNAV) published a Concept of Employment (COE) for the MPF T-AKEs.²⁷ This COE explains how the Marine Corps envisions employing the MPF T-AKEs and highlights the differences between a MPF T-AKE mission and expected capabilities with that of a CLF T-AKE.

The CLF is designed to be the supply lines for U.S. Navy Ships at sea by providing sustainment (e.g., fuel, food, ordnance, spare parts, and mail) to enable the fleet to remain at sea without the need to go to port to replenish its stocks.²⁸ The COE points out that while the MPF T-AKEs will be integrated into the GCC's assigned MPSRONs to support the prepositioning of a

MEB, they will also be available to assist scalable MAGTFs in the same fashion that the CLF supports the fleet. Potential employment opportunities described in the COE include MAGTFs operating in low to mid-intensity operations, such as theater security cooperation, global fleet stations, foreign humanitarian assistance / disaster relief, serving as a direct support station / shuttle ship to an amphibious ready group / task force, or as an Afloat Forward Staging Base.²⁹

The COE states the mission of the MPF-TAKE is to:

Contribute to the prepositioning of a MEB and provide sea based sustainment via selectively offloadable, tailorable, unitized sustainment packages through vertical / surface retail distribution in order to sustain Marine forces operating afloat and ashore. Be prepared to contribute to the replenishment and sustainment of combined and joint forces ashore by increasing throughput and access to common item support.³⁰

For the sake for fiscal efficiencies, the DoN leadership has agreed to limit certain capabilities aboard the MPF T-AKEs in comparison to those in the CLF. All T-AKEs are capable of receiving and discharging equipment and supplies via underway replenishment (UNREP) in the form of vertical and conventional replenishment (VERTREP/ CONREP) or through the use of the ships cranes when pier-side or at anchor during limited sea-state conditions.³¹ While Military Sealift Command (MSC) will crew all the T-AKEs, the MPF T-AKEs will only be manned with the minimum amount of MSC cargo teams required to conduct UNREP and will be augmented by additional cargo teams as the mission dictates.³² Figure 5 shows an example of the VERTREP / CONREP process. Unlike the CLF, the MPF-TAKEs will not have aircraft assigned to the vessels and will rely on external air support to conduct VERTREP. These aircraft shall be provided by the supported MAGTF's Air Combat Element (ACE) or by other aircraft as directed by the Joint Force Commander.³³ MPF-TAKEs will have a standing detachment of contracted support embarked to manage USMC sustainment inventory

which can be augmented by active duty Marines as the mission dictates.³⁴ This Marine specific inventory will be capable of being replenished underway via VERTREP/CONREP or by shuttling to an advanced base / supply hub in theater for a pier-side on-load.

What makes the MPF T-AKE a potential “game changer”

The method of receipt, storage and delivery of its cargo is what sets the T-AKE apart from other Maritime Prepositioning Ships (MPS). Like all MPS, equipment and supplies will be loaded aboard the T-AKEs on the east coast of the United States according to a prepositioning objective (PO) developed and approved by Headquarters Marine Corps in coordination with the Marine Operating Forces.³⁵ However, it will not be altogether necessary for the T-AKE to return to the U.S. to replenish its cargo. Rather, pallets can be delivered to the T-AKE via VERTREP, CONREP, or by using the ship’s crane either pier-side or in limited sea-state conditions to replace what it has distributed.³⁶ This capability will allow the T-AKE to remain on station, ready to respond in fulfillment of any prepositioning requirements, while also being able to respond to the appropriate steady-state requirements of the GCCs without substantial risk to the PO. This should be of significant interest to the GCCs because the PO is used by their operational planners to prepare for the use of the prepositioned equipment and supplies, as well as the subsequent movement of the fly-in-echelon, to realize the full MEB capability that each MPSRON is designed to support. The draft PO for the first T-AKE to be introduced to the MPF is included in Appendix C.

* MPS are typically loaded at Blount Island Command (BIC) in Jacksonville, Florida. Ammunition for the USNS *Fisher* is loaded at Military Ocean Terminal Sunny Point in North Carolina for explosive arch purposes and the first T-AKE is planned to load its palletized ammunition in Charleston, SC. (Source: Email with Blount Island Command Operations Officer, Mr. Robert Cote, 21 March 2012)

The T-AKEs will bring a significant improvement to the MPF by enabling the selective access to needed supplies and the direct delivery of tailored sustainment from the ship to the forces operating ashore.³⁷ The difference between a T-AKE and a traditional MPS delivering sustainment is that, in lieu of the twenty foot equivalent unit (TEU) containers used to store sustainment aboard the rest of the MPF, the T-AKE is designed to utilize palletized loads. Figure 6 contains typical pictures of containerized supplies loaded aboard a MPS and the container operation terminal established following an MPF offload. Prior to the T-AKE's palletized sustainment capability there was only one sustainment option available during an MPF operation. TEUs -some of which contained sustainment- were offloaded and transported to a container operations terminal where they were sorted, contents were unpacked, and then prepared for further distribution to the using military units via ground or air transportation.

In addition to the time and distribution efficiencies the MPF T-AKEs will offer, offloading from a T-AKE reduces the size and the vulnerability of the onshore presence. The traditional MPS offload of containers requires a larger number of personnel to operate and secure the conterminal operations terminal.³⁸ In order to stage the number of containers offloaded, a large facility needs to be secured or constructed which may create a more visible target for future adversaries.³⁹ Utilizing sea based logistics, to include the MPF T-AKEs, allows units to optimize the manpower, equipment and sustainment ashore by only pushing or pulling supplies when needed thus avoiding the buildup of an "the iron mountain."⁴⁰

THE MPF T-AKE'S ROLE IN THE AMPHIBIOUS CONCEPT OF SUSTAINMENT

How the T-AKE fits the niche role in the evolving security environment

In January of 2012 the President of the United States and the Secretary of Defense provided guidance for prioritizing the Department of Defense's resources for the 21st century.⁴¹ This

Defense Strategic Guidance (DSG) points out that while the U.S. military is anticipated to continue to contribute to global security, it is necessary to rebalance and shift focus toward the Asia-Pacific region, emphasizing the ability to operate in “anti-access environments” and utilizing “innovative, low-cost, small footprint approaches” to achieve security objectives.⁴² Due to the overwhelming amount of littoral access that must be assured to maintain security in the global commons, the Asia-Pacific region draws immediate attention to the value of naval forces: innovative use of the MPF T-AKEs may provide a low-cost, small footprint type solution that the Geographic Combatant Commander requires for this strategy.

The Defense Strategic Guidance also introduced the Joint Operational Access Concept (JOAC) which was also released in January 2012. The JOAC, published by the Chairman of the Joint Chiefs of Staff, describes in broad terms “how joint forces will operate in response to emerging antiaccess and area-denial (A2/AD) security challenges.”⁴³ The JOAC highlights the positive attributes of forward deployed naval forces, stating that these forces “can remain on station in international waters almost indefinitely,” remaining independent from the level of protection and sustainment required at forward bases, which can become a political liability “by causing friction with the host nation or within the region.”⁴⁴

The JOAC prefers the reduced challenges to access, inherent mobility, and subsequent improved security as well as the operational flexibility that the seabase offers the Combatant Commanders. The anticipated future tactical and/or geo-political situations may not permit the buildup of the proverbial “iron mountain” or forward base. Geo-politically speaking, the establishment of a U.S. logistics hub may not be permitted by future host nations. Additionally, in a disaster relief scenario, the host nation infrastructure may be degraded to the point that timely delivery and throughput of contracted sustainment -for the relief force and the victims-

will not initially be an option. Given the threat by today's modern anti-access technologies, having the strategic flexibility to seabase sustainment is as important as ever. Operating in an A2/AD environment, a Single Naval Battle approach can be employed by utilizing the suppressive effects of air and long-range naval fires to gain relative domain superiority, open an access corridor, and enable the penetration and delivery of seabased logistics to forces operating ashore.

The Amphibious Fleet Requirement

Despite the anticipated need for amphibious forces, obtaining the number of required amphibious ships remains an elusive goal for the Department of the Navy. In a January 2009 formal response to the House Armed Service Committee, the Chief of Naval Operations and the Commandant of the Marine Corps determined that the force structure requirement to support a two MEB lift was 38 total amphibious assault ships; but, due to fiscal constraints they agreed to sustain a minimum of 33 total amphibious ships in the assault echelon.⁴⁵ “The Nation’s forcible entry requirement includes two simultaneously-employed MEBs supported by one or more MPF-MEB to fight as a Marine Expeditionary Force from a sea base.”⁴⁶ Under the Navy’s Fiscal Year 2012 ship building plan, the inventory of amphibious ships will reach at least 33 ships for only 15 of the next 30 years—between 2017 and 2031.⁴⁷ (see Figure 1) The total amphibious fleet inventory will average out to 30 amphibious ships over the next 30 years.⁴⁸ Not only will the amphibious ship numbers fail to reach the mark required to conduct a two MEB amphibious assault, but the inventory will not be enough to meet the goals established in 2010 by the GCCs for peacetime amphibious capabilities around the globe.⁴⁹ “The lack of amphibious warship lift capacity translates to risk for the Nation, particularly as it reorients to the Pacific.”⁵⁰ Thus, the

GCCs will have to develop new creative approaches to satisfy their requirements and optimize the embarkation space aboard amphibious shipping to support their most desirable mission sets.

Growth of the MAGTF

Over the past decade of ground combat the MAGTF has grown to the point that embarkation requirements have exceeded the capacities of amphibious shipping, already shown to be in short supply. Depending on the amphibious ship mix, between 41 and 53 percent of future MEU's embarkation requirements will fall into the category of "remain behind equipment" (RBE) and will not be loaded aboard amphibious shipping unless changes are made.^{51,52} The Commandant of the Marine Corps addressed this risk by tasking the Deputy Commandant for Combat Development and Integration to develop a plan for reducing the size and weight of MEUs and MEBs to fit within the predicted future "lift constraints."⁵³ One of several required risk mitigation options is to utilize equipment and supplies aboard Maritime Prepositioning Ships, to include the T-AKEs, to augment the equipment and supplies embarked aboard amphibious shipping.⁵⁴ The MPF T-AKE offers an option to optimize the equipment and supplies embarked aboard amphibious shipping for the mission sets that the GCCs dictate most important while ensuring that support for other missions, determined less likely or dangerous, are also adequately accounted for in operational planning aboard the MPF's newest platform.

By comparing the prepositioning objectives for a MPF T-AKE (Appendix C) and the loaded quantities of the LFORM aboard the amphibious ships (Appendix A), risk based decisions to optimize the embarked sustainment aboard the amphibious ships can be made. Take for example the provision of meals ready to eat or MREs. On an LHA, 188 pallets of MREs are loaded in the cargo holds as part of the LFORM, consuming valuable cubic square feet of embark space. The amount of MREs loaded on amphibious shipping could be reduced by

augmenting the total requirement with MREs loaded on the MPF T-AKE, 1232 pallets. This would allow for sustainment that is loaded in Quadcons- and consuming valuable square footage on the vehicle decks- to be shifted to the cargo holds in place of the MREs. Reducing the number of nice-to-have Quadcons that must be stowed on the vehicle/hanger/flight decks allows for rolling stock, deemed a higher priority, to take the new available space on the vehicle decks.

Additionally, the MPF T-AKEs are capable of carrying Class VII (Major End Items, such as rolling stock) equipment sets that fit within the height / weight restrictions of the T-AKEs and are capable of being lifted internally or externally by rotary wing aircraft. The ability to internally or externally transport rolling stock off of MPS has been limited in the past by the lack of easy access to the flight deck from the vehicle storage decks; the T-AKEs do not have this limitation. The Class VII loaded would likely fall in the GCC's mission areas, determined less likely or dangerous, providing a hedge against the risk of leaving equipment off amphibious shipping all-together, or relying on other means to deliver equipment in a timely manner when required.

The T-AKE can also assist in reducing the amount of embarkation space taken up by Class IX repair parts. Typically these items are loaded on amphibious shipping in Quadcons. The T-AKEs have the ability to load these items in cabinets as shown in Figure 7. Accessing spare parts in Quadcons can be problematic within the confines of the tightly packed vehicle decks on the amphibious ships. The amount of Class IX could be reduced and space aboard amphibious shipping could be recapitalized in the same manner as in the previously described MRE example.

Maintaining the Relevancy of the MPF

Over the last several years the Marine Corps has fought to defend and maintain the relevancy of the MPF program in a fiscally constrained environment. One example is the Marine

Corps' participation in the Office of the Secretary of Defense and U.S. Transportation Command lead Mobility Capabilities and Requirements Study 2016 (MCRS-16) that was used to inform the 2010 Quadrennial Defense Review. The study found that "for the specific scenarios/warfigths assessed, the majority of ground combat components of the currently programmed afloat prepositioned sets were not used until well after sealift closure [i.e. AFOE] from the CONUS."⁵⁵ This brought into question the relevancy of the prepositioning program and spawned multiple other classified studies to examine what some considered an expensive "floating warehouse."⁵⁶ In August 2010, the Department of the Navy directed a fiscal efficiency that assumed the risk of putting one of three MPSRONS into a reduced operating status (ROS).⁵⁷ Following that decision, a DoD led comprehensive review of all DoD prepositioning capabilities determined that the Mediterranean MPSRON, slated to be put in ROS, could be eliminated without additional risk to the new defense strategy.⁵⁸ The remaining two MPSRONS that are funded in Presidential Budget 2013 will remain sited in Diego Garcia and the Northern Mariana Islands. In the resource-constrained era that the DoD is facing, making the most of every asset—like the two MPF T-AKEs scheduled to join the remaining MPSRONS beginning in July of 2012—may be the difference between a program's termination and survival.

Weighted against the advantages described earlier, responsible planners will need to do a cost based analysis to determine when it is fiscally appropriate to employ the MPF T-AKE to support amphibious operations. The data in Table 1 was provided by Military Sealift Command in support of this paper and shows the estimated steaming distances, times, and costs to various locations around the world from the anticipated MPF T-AKE locations. This data should be taken into consideration and compared against other sustainment options, such as purchasing additional sustainment and paying freight forwarding charges for surface or air transportation,

when determining the cheapest and fastest way to receive a given amount of cargo. There are times when the advantages across the levels of war do not outweigh the pure fiscal costs that come with employing the MPF T-AKEs. For example, the decision to steam a MPF T-AKE from the Northern Mariana Islands to the Western Southern Atlantic Ocean to deliver sustainment would require some very extenuating circumstances to justify the large cost in time and money. However, considering that in less than four days and an estimated cost of \$210,000 an entire T-AKE loaded with Marine Corps sustainment could be in the Philippine Sea ready to support forces ashore, the MPF T-AKE is the most viable means to sustain a sizable force.

Up until this point, this paper has provided evidence and hypotheses regarding the ability of the MPF T-AKEs to provide seabased sustainment for amphibious operations. In order to experiment with the ideas laid out in the MPF T-AKE concept of employment, an in vivo exercise would be required. Such an exercise would provide an opportunity to assess the capabilities and limitations of implementing such a concept. On February 9, 2012 during Exercise Bold Alligator, the viability of employing the T-AKEs in support of amphibious operations was tested.

PROOF OF CONCEPT (See Figure 8)

Exercise Bold Alligator-2012 (BA-12) was conducted to plan and execute a MEB-sized amphibious assault from a seabase in a medium threat A2/AD environment to improve naval amphibious core competencies.⁵⁹ One objective of the exercise was to integrate technological, platform, and unit experimentation to enhance future amphibious capabilities, such as the delivery of seabased sustainment from a T-AKE to forces operating ashore.⁶⁰ In preparation for Exercise Bold Alligator, the crew of USNS *Robert E. Peary* (T-AKE 5) conducted training with VMM-266 in MCAS New River, NC to learn the specifics of how to chain down, load, refuel,

and launch and MV-22 Osprey.⁶¹ On 9 February 2012, an aircrew of Marines departed USS *Wasp* (LHD-1) in an Osprey bound for the T-AKE-5 173 nautical miles away.⁶² The Marine aircrew landed an MV-22 aboard T-AKE-5 and was loaded with four pallets of sustainment (consisting of food, five gallon fuel and ammunition cans) and refueled by T-AKE-5's CIVMAR crew prior to departing to deliver the sustainment directly to Marines exercising ashore approximately 110 miles away.* (Figure 9 depicts the full mission profile and provides additional details of the resupply mission) Additionally, a High Mobility Multi-Wheeled Vehicle (HMMWV) was successfully embarked aboard T-AKE-5 and maneuvered between the various cargo holds, weather decks, and cargo elevators. (See Figure 10) This confirmed the limited capability of the T-AKE to embark rolling stock that could then be transported ashore by aircraft such as the MV-22 or even potentially transferred (using the ship's organic cranes) to landing craft that come alongside the T-AKE in limited sea states.† These experiments validated many of the ideas in the COE drafted nearly 2 years prior and marked the first time in an at sea exercise that an MV-22 has landed aboard a Military Sealift Command vessel of any kind.⁶³ There were many lessons learned during the exercise that will help make this proof of concept a practiced capability in the future.

MOVING FROM CONCEPT TO EXECUTION

There are a number of items that must be improved upon to implement the ideas proposed by the author and the concepts demonstrated during the T-AKE's role during Exercise Bold Alligator-2012. This section of the paper attempts to capture both material and non-material

* The actual MV-22 that departed USS *Wasp* was diverted to MCAB New River due to mechanical problems. The same air crew boarded a new MV-22 and flew what was an even longer leg to T-AKE-5.

† This experiment is planned for future exercises

solutions that are proposed to make this concept a reality by using the construct of doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF). The proposed changes, although minimal on an individual level, will require a significant shift in implementing contemporary expeditionary logistics.

Doctrinally, the Joint Force and specifically the Department of the Navy must embrace the Signal Naval Battle Concept. The majority of the referenced doctrinal publications, orders and policies will need to be updated and revised to capture how to sustain amphibious combat operations in concert with the MPF T-AKE to reflect this whole of Navy approach. Of specific importance is clarification on how to request and receive approval to employ this platform and the sustainment it carries. The current authoritative document on this subject provides the Services and GCC component commands the flexibility to conduct theater security cooperation (TSC) exercises, training exercises, and experimentation through coordination at the affected GCC level.⁶⁴ Beyond that, the process becomes more complicated as explained in the Chairman of the Joint Chiefs of Staff Instruction on the subject:

A GCC requests authority to employ “cargo, equipment and capabilities” resident aboard a MPS with a request-for-forces (RFF) only if “forces” are included in the request. Otherwise, the Service or GCC requests should originate as an Operational Needs Statement or Joint Urgent Operational Needs Statement and sent to the Joint Staff/J-4 for action. The SECDEF decision will normally come as part of a DEPOD or EXORD.⁶⁵

It is easy to understand the hesitancy of an Amphibious MAGTF Commander to put his trust in this long approval chain to receive the sustainment loaded aboard the T-AKE. If the GCC and component staffs can coordinate restoring the MPF T-AKE to its original condition prior to employment the approval authority should reside at the GCC level, as it does with TSC exercises, and not with SECDEF.

No major changes are required to the **organization** of the Marine Corps to support this concept, but when combined with the **personnel** category of DOTMLPF there are some required considerations for ensuring the availability of qualified people to maintain all required ship certifications and provide adequate responsiveness for peacetime, wartime, and various contingency operations. The detachments that are planned to embark the T-AKEs during periods of increased operational tempo will need to be adjusted. The full complement of 124 MSC CIVMARs that make up a T-AKE crew is neither cost effective nor necessary when the MPF T-AKE is in “pure” prepositioning role and not supporting amphibious operations. However, the concept to surge additional CIVMARs to reinforce the minimal day-to-day MSC crewing levels needs to take into account that the primary value of employing the MPF T-AKE to support amphibious operations is the speed in which it can support crisis response situations—delay in getting the surge CIVMAR crew to the T-AKE negates that value. Likewise, amphibious MAGTFs need to have pre-established support detachments that are ready to augment the regularly embarked contracted personnel aboard the MPF T-AKEs.

Further study is required to determine if these detachments are best sourced from the deployed MAGTF that they will be supporting or from CONUS by Marines quickly deployed from a heightened or prepared-to-deploy status; regardless, the detachment needs to have capabilities similar to those contained in the landing force’s tactical logistical group (TACLOG).^{*} Additionally, the detachment will need the capability to properly manage the fluctuating inventory, supervise the CIVMARs as they build pallets for delivery to forces ashore, and communicate via voice and data with all involved in the sustainment chain to include tactical

^{*} Tactical-Logistical Group (TACLOG) - Representatives designated by troop commanders to assist Navy control officers aboard control ships in the ship-to-shore movement of troops, equipment, and supplies. Also called TACLOG group. Source: JP 3-02

airframes conducting the resupply. Further analysis is required to determine the feasibility of employing air delivery capabilities to deliver sustainment from the MPF T-AKEs.

Training is an essential element to bring this concept to reality. As the Cooperative Strategy for 21st Century Seapower points out, all echelons of command must enhance their ability to conduct integrated planning, execution, and assessment.⁶⁶ The unique integration of Marines, Sailors, and CIVMARs working between amphibious ships and the MPF-TAKEs, all connected through military aircraft, far exceeds the supporting / supported relationship that is currently within the comfort zone of our operating forces. As the Commander of MSC stated during Exercise Bold Alligator -2012, “We have to practice this type of integrated operations. The GCCs are counting on the MPSRONS in a big way for their OPLANS but are likely unaware of the capabilities that the T-AKE can bring to steady state operations.”⁶⁷ All involved will need a venue and metric to assess and report their ability to execute this new mission. This will require more opportunities to exercise with T-AKEs in general. It will also require revising—or in some cases developing— mission essential tasks (METs) to capture the requirements for the Marine detachment, MSC Crew, as well as additional training for Supply and Logistics Marines involved across the supply chain. Incorporating T-AKEs (MPF or CLF) into the MEU predeployment training at-sea-periods while CONUS could help bridge this gap. Long range planning to coordinate the integration of the MPF T-AKEs is required due to the cost of fuel to exercise the T-AKE.

Very little additional **materiel** is required to implement this concept. The equipment and supplies utilized from the MPF T-AKEs will already be afloat as part of the prepositioning programs or routed through to the T-AKE through NLI. Backfilling prepositioned equipment and supplies that are utilized or consumed will be a cost that should usually be paid by the forces

that use them with exceptions for shelf-life rotations etc. on a case-by-case basis. Further exercise and experimentation will shape the requirements to modify what is loaded aboard the MPF T-AKEs to include exploring options to load equipment sets (to include rolling stock) such as the one flown in from amphibious shipping with the experimental landing team operating at Fort Picket, VA during exercise Bold Alligator.

Changes in **leadership and education** are essential to the success of this concept. It is not enough for Marine Corps leadership alone to be proponents for this concept. The education must permeate the staffs from the MEU level through the Navy and Marine Corps Component Commander's Staffs, the OPNAV, MSC, HQMC, the Joint Staff and the Geographic Combatant Commands. It is not enough for a MEU Commander to be comfortable with assuming the risk of having equipment and supplies loaded aboard the MPF T-AKEs (vice his assigned ARG). All vested parties must be well versed in this integrative concept, as well as in the capabilities and limitations of MPF T-AKEs to include their inventories and the request process required to employ them.

The modifications to **facilities** required to implement this concept are negligible. Marine Corps Logistics Command's Blount Island Command is prepared to introduce the MPF T-AKE into the prepositioning programs. Further exercises and experimentation will undoubtedly refine and uncover more required ship board modifications to optimize the MPF T-AKE to support seabased operations. Some of the initial recommended modifications from exercise Bold Alligator include a space to conduct calibration of sensitive equipment, a battery charging facility for wet cell and lithium batteries, a space to secure weapons and sensitive communications items and improvements to the ships secured and non-secured voice and data

communications.⁶⁸ Further research is required to determine what ship modifications are required, if any, to allow for the refueling of armed aircraft.⁶⁹

COUNTER ARGUMENTS

History has shown that changing the status quo must be undertaken with eyes-wide-opened. For example, during the Falklands War, the sinking of the SS *Atlantic Conveyor* (an unarmed British merchant navy ship) considerably reduced the British assault support and logistics capacity.⁷⁰ Like the SS *Atlantic Conveyor*, the T-AKEs are non-combatant ships. As previously mentioned, T-AKEs are crewed by CIVMARs and are designated United States Naval Service (USNS), and not United States Ship (USS) like the amphibious warships. The MPF T-AKEs will have very limited force protection capability and in the near term will need to operate--as the CLF fleet does today-- under the protection of the USS ship's in Ready/Strike Groups or by using the extended range of aircraft, like the MV-22, to remain in permissive environments and outside immediate the threat areas. Lessons learned from the Falklands war warrant future research to increase the force protection capabilities of the MPF T-AKE through the application of modular weapon systems such as the Vulcan-Phalanx.⁷¹ Besides the physical threat to the MPF T-AKEs, future operators will have to take into consideration the limited budget set aside for steaming these platforms.

The steaming cost required to implement this concept is a valid concern that can be addressed though detailed planning, making smart cost decisions, and through education. The OPNAV/HQMC published COE notes that training exercises should be identified as part of rolling 5-year schedule that is updated on a quarterly basis.⁷² This is designed to allow GCC's Navy/Marine Corps Component Commanders and MSC maximum time to synchronize training

objectives to make the most out of limited funded steaming days.* For example, MSC can plan for the MPF T-AKEs to be underway to maintain crew proficiency and certifications while steaming at its most efficient speed to conserve fuel while enroute to support a MEU during a CJCS directed TSC exercise.† That said, leadership will need to make cost based decisions to insure that the MPF-TAKE's steaming costs do not overshadow the training value of the exercise it is being sent to support. It is paramount that DoD leadership is educated on how employing the MPF T-AKEs effectively in the steady-state environment can improve their readiness to combat an A2/AD threat while potentially leading to strategic lift cost avoidances.

Some might argue the Marine Corps should simply enter into agreement with the Navy to utilize the excess capacity currently available aboard the CLF-TAKEs to implement the ideas put forth.‡ While a partially valid idea, it does nothing to change the “break glass in time of war” perception of the prepositioning programs and does not allow the Marine operating forces and MSC crew the opportunity to exercise with the ships and load configurations that they will have to employ in the event an MPF T-AKE would be needed to support a full MEB offload.

The ideas proposed in this paper coupled with the theory of Single Naval Battle challenge the current conventional wisdom that discourages the use of sustainment prepositioned on the MPF to support steady-state exercises and operations. However, if it is found that, after loading thirty days of sustainment between the MPF T-AKE and its MPSRON, there is enough cubic square feet to load and segregate the PO with enough room for additional sustainment to be loaded specifically for steady-state use, it makes sense to use the “steady-state” cargo first

* The MPF T-AKEs have approved peacetime OPTEMPO of 14 percent or approximately 51 steaming days per year.

† Most efficient speed 40.9 RPMs ~7Kts (Interview with CHENG T-AKE 5)

‡ On average the CLF T-AKEs are currently supporting the fleet while only using ~65 percent of their cargo capacity. (interview with CAPT Little, T-AKE-5)

allowing the PO to be preserved. Regardless, the PO should not be fenced off from use in steady-state operations at the detriment to amphibious sustainment requirements given that it can be replenished underway.

CONCLUSION

This paper proposes that the value of the MPF T-AKE should be measured against its ability to contribute to the prepositioning of a Marine Expeditionary Brigade as well as its potential to contribute to sustaining amphibious operations as part of the whole naval expeditionary system. The latest strategic defense guidance calls for forces that are “responsive” and “remain prepared” to deter and defeat aggression.⁷³ While not the panacea of expeditionary logistics, the MPF T-AKEs provide the GCCs another sustainment option across the breadth of naval capabilities at their disposal.

The GCC demand for amphibious forces exceeds the capacity of the current number of amphibious ships and is anticipated to increase as new missions emerge across the range of military operations. This is a converging issue with the increased size of the MAGTF that requires additional embarkation aboard scarce amphibious shipping. The MPF T-AKE—while far from a replacement for amphibious shipping—offers an opportunity to do things differently, rather than continuing with the status quo and asking the GCCs to accept a reduced afloat expeditionary capacity.

The MPF T-AKEs will afford the first significant opportunity to operationalize the MPF for steady-state operations. By selectively integrating the MPF’s newest platform into amphibious operations, the expeditionary nature of the MAGTF can be improved while simultaneously maintaining the relevance of Marine Corps’ afloat prepositioned resources. In an

era of DoD-wide declining fiscal resource availability a MPF T-AKE that supports the range of military operations has more potential longevity than one that supports repositioning alone.

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²⁵ Francis W. Cunningham. *T-AKE Program Exchange between Preposition and Naval Fleet Auxiliary Force: Hull Swap of T-AKE 12-14 with T-AKE 1-3*. Military Sealift Fleet Support Command Information Paper. Washington Navy Yard, DC: May 6, 2011.

²⁶ Daniel Atkinson, Maritime Prepositioning Force Officer, Deputy Commandant for Plans, Policies and Operations, Headquarters U.S. Marine Corps, conversation with author, February 3, 2012.

²⁷ Headquarters U.S. Marine Corps. *Maritime Prepositioning Force (MPF) Auxiliary Dry Cargo/Ammunition Ship (T-AKE) Concept of Employment*. Official Message. (CMC WASHINGTON DC PPO POE), DTG: 291447Z Mar 2010.

²⁸ Military Sealift Command, *Combat Logistics Force Webpage*, www.msc.navy.mil/pm1/ (accessed February 12, 2012).

²⁹ Headquarters U.S. Marine Corps. *Maritime Prepositioning Force (MPF) Auxiliary Dry Cargo/Ammunition Ship (T-AKE) Concept of Employment*. Official Message. (CMC WASHINGTON DC PPO POE), DTG: 291447Z Mar 2010.

³⁰ Headquarters U.S. Marine Corps. *Maritime Prepositioning Force (MPF) Auxiliary Dry Cargo/Ammunition Ship (T-AKE) Concept of Employment*. Official Message. (CMC WASHINGTON DC PPO POE), DTG: 291447Z Mar 2010.

³¹ General Dynamics, *Lewis and Clark (T-AKE 1) Class Dry Cargo/Ammunition Fact Sheet*, January 2007.

³² Headquarters U.S. Marine Corps. *Maritime Prepositioning Force (MPF) Auxiliary Dry Cargo/Ammunition Ship (T-AKE) Concept of Employment*. Official Message. (CMC WASHINGTON DC PPO POE), DTG: 291447Z Mar 2010.

³³ Headquarters U.S. Marine Corps. *Maritime Prepositioning Force (MPF) Auxiliary Dry Cargo/Ammunition Ship (T-AKE) Concept of Employment*. Official Message. (CMC WASHINGTON DC PPO POE), DTG: 291447Z Mar 2010.

³⁴ Headquarters U.S. Marine Corps. *Maritime Prepositioning Force (MPF) Auxiliary Dry Cargo/Ammunition Ship (T-AKE) Concept of Employment*. Official Message. (CMC WASHINGTON DC PPO POE), DTG: 291447Z Mar 2010.

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³⁷ Headquarters U.S. Marine Corps, *Marine Corps Prepositioning Road Map 2025: Shaping Global Prepositioning* (Washington, DC: Headquarters, U.S. Marine Corps, July 2009), 26.

³⁸ Headquarters U.S. Marine Corps, *Marine Corps Prepositioning Road Map 2025: Shaping Global Prepositioning* (Washington, DC: Headquarters, U.S. Marine Corps, July 2009), 25.

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⁴² U.S. Department of Defense. *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense*. January 5, 2012, 3.

⁴³ U.S. Department of Defense. *Joint Operational Access Concept*. January 17, 2012. http://www.defense.gov/pubs/pdfs/JOAC_Jan%202012_Signed.pdf (accessed January 20, 2012), foreward.

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⁴⁵ D. Winter, J. Roughhead and J. Conway. *Report to Congress on Naval Amphibious Force Structure*, January 7, 2009.

⁴⁶ House Committee on Appropriations, 18-19.

⁴⁷ Douglas W. Elmendorf, *An Analysis of the Navy's Amphibious Warfare Ships for Deploying Marines Overseas*. Congressional Budget Office Report. Washington, DC: CBO, November 2011. <http://www.cbo.gov/publication/42716> (accessed January 12, 2012), 1.

⁴⁸ House Committee on Appropriations, 19.

⁴⁹ Douglas W. Elmendorf, *An Analysis of the Navy's Amphibious Warfare Ships for Deploying Marines Overseas*. Congressional Budget Office Report. Washington, DC: CBO, November 2011. <http://www.cbo.gov/publication/42716> (accessed January 12, 2012), 1.

⁵⁰ House Committee on Appropriations, 19.

⁵¹ *DoD Dictionary of Military Terms*, http://www.dtic.mil/doctrine/dod_dictionary/ (accessed January 10, 2012).

⁵² Headquarters U.S. Marine Corps. *Lighten the MAGTF Executive-Capabilities Development and -Integration Board*. Marine Corps Combat Development Command, Capabilities Development Directorate, COA Selection Power Point Brief. July, 7, 2011, 19.

⁵³ Headquarters U.S. Marine Corps. *35th Commandant of the Marine Corps: Commandant's Planning Guidance 2010*. Washington, DC: Headquarters, U.S. Marine Corps, Oct. 22, 2010, 13.

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⁵⁵ U.S. Department of Defense. *Executive Summary: Mobility Capabilities and Requirements Study-2016*. MCRS 2016. July 2009, 6-7.

⁵⁶ David H Gurney and Jeffrey D Smotherman, "An interview with James T. Conway." *Joint Forces Quarterly* 59, 4th quarter (July-Sept 2010), 11.

⁵⁷ Daniel Atkinson, Maritime Prepositioning Force Officer, Deputy Commandant for Plans, Policies and Operations, Headquarters U.S. Marine Corps, conversation with author, February 3, 2012.

⁵⁸ Daniel Atkinson, Maritime Prepositioning Force Officer, Deputy Commandant for Plans, Policies and Operations, Headquarters U.S. Marine Corps, conversation with author, February 3, 2012.

⁵⁹ Expeditionary Warfare Collaborative Team. "Exercise BOLD ALLIGATOR 2012 T-AKE Outbrief" (Powerpoint Brief, January 4, 2012), 3.

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⁶² Gonzales, Pascal. "T-AKE Frag Recap." VMM-266 Powerpoint Brief, March 16, 2012.

⁶³ Mark H. Buzby, Commander, Military Sealift Command face-to-face interview with author, February 9, 2012.

⁶⁴ U.S. Department of Defense. Logistics Planning Guidance for Global Pre-positioned Materiel Capabilities. CJCSI 4310.01C, July 30, 2009. http://www.dtic.mil/cjcs_directives/cdata/unlimit/4310_01.pdf (accessed February 16, 2012), A-1.

⁶⁵ U.S. Department of Defense. Logistics Planning Guidance for Global Pre-positioned Materiel Capabilities. CJCSI 4310.01C, July 30, 2009. http://www.dtic.mil/cjcs_directives/cdata/unlimit/4310_01.pdf (accessed February 16, 2012), A-1.

⁶⁶ Headquarters U.S. Marine Corps, U.S. Department of the Navy, and U.S. Coast Guard. *A Cooperative Strategy for 21st Century Seapower*. Washington, DC: Headquarters U.S. Marine Corps, October 2007, 14.

⁶⁷ Mark H. Buzby, Commander, Military Sealift Command face-to-face interview with author, February 9, 2012.

⁶⁸ Marine Detachment and EWCT, face-to-face interview with author, Exercise BOLD ALLIGATOR-2012, February 9, 2012.

⁶⁹ Flight Crew of T-AKE-5, face-to-face interview with author, Exercise BOLD ALLIGATOR-2012, February 9, 2012.

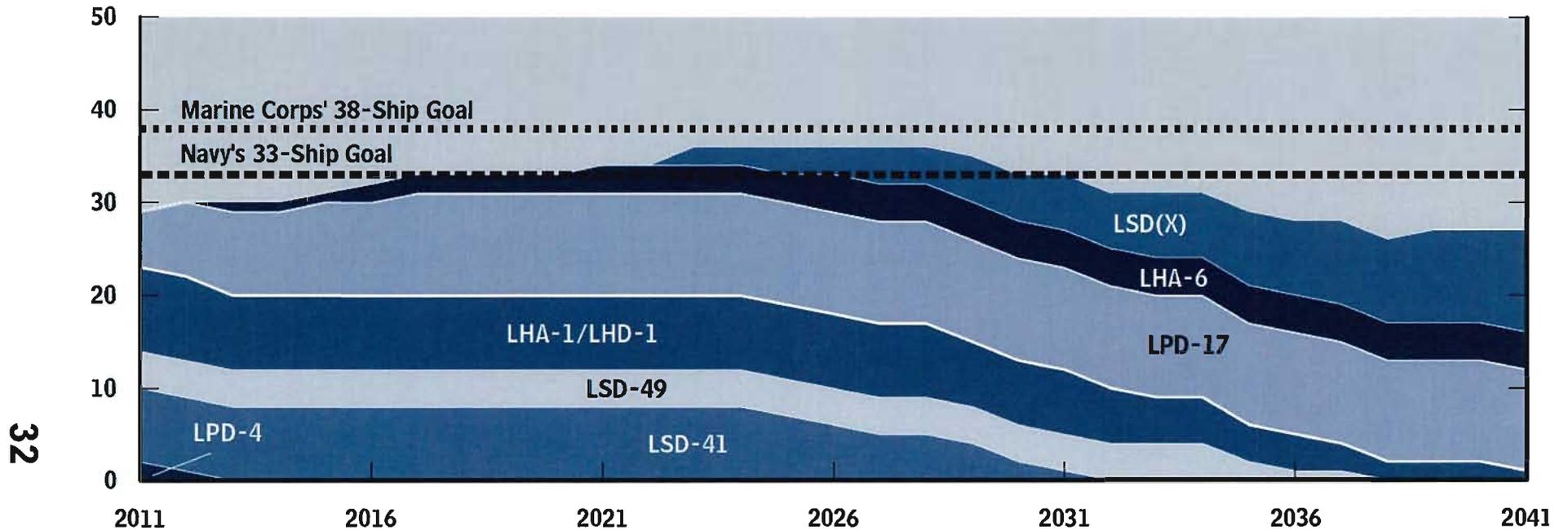
⁷⁰ Anderson, Duncan. *The Falklands War 1982* (Great Britain: Osprey Publishing, 2002), 48.

⁷¹ Steven Gorton, "Thoughts on the Falkland Island War," *Proceedings* 108/9/955 (September 1982): 106.

⁷² Headquarters U.S. Marine Corps. Maritime Prepositioning Force (MPF) Auxiliary Dry Cargo/Ammunition Ship (T-AKE) Concept of Employment. Official Message. (CMC WASHINGTON DC PPO POE), DTG: 291447Z Mar 2010.

⁷³ U.S. Department of Defense. *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense*. January 5, 2012, 4.

Inventory of Amphibious Warfare Ships



Source: Congressional Budget Office.

Note: LPD = amphibious transport dock; LSD = dock landing ship; LHA and LHD = amphibious assault ships.

Source:

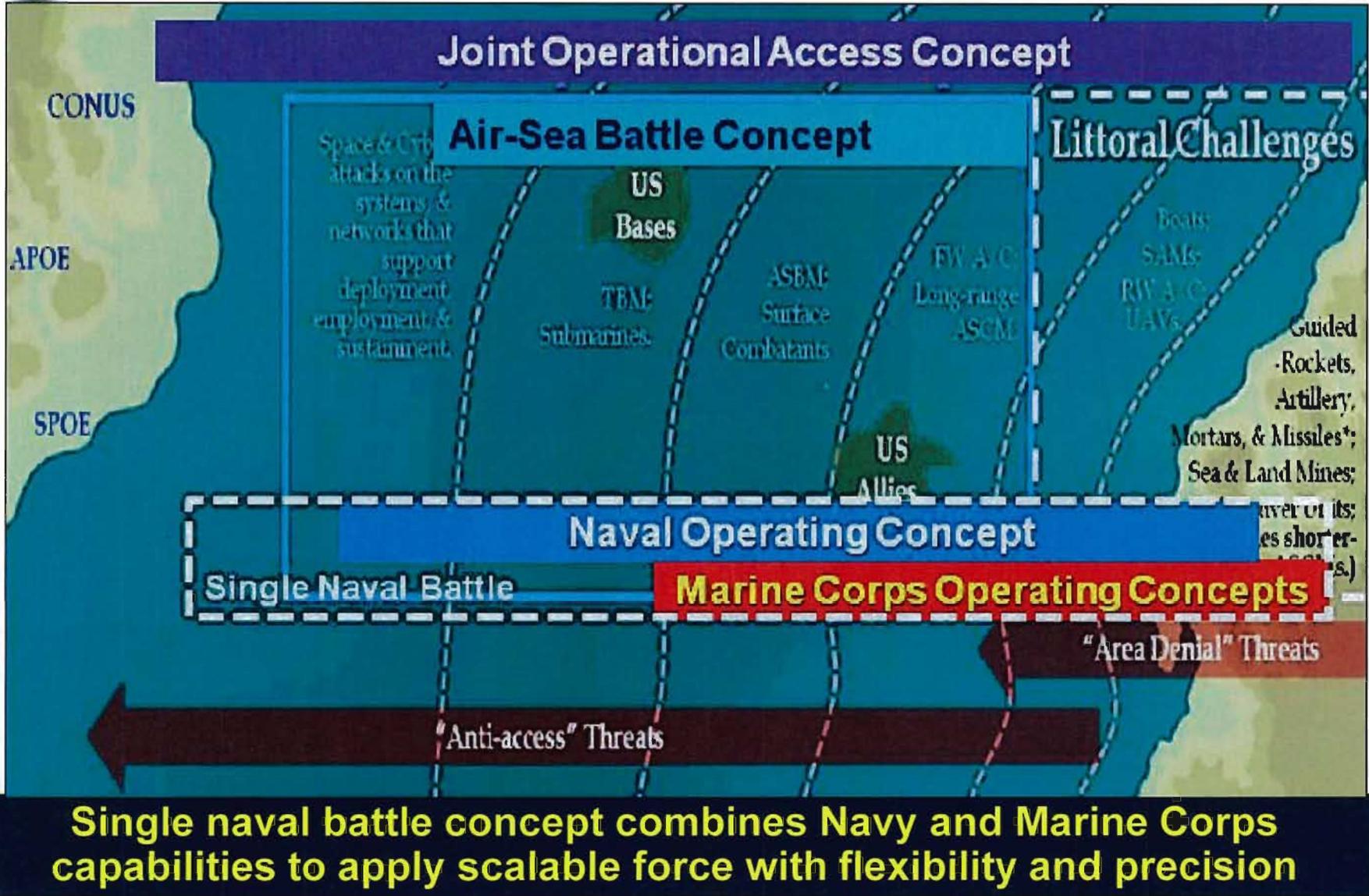
Congressional Budget Office:

“AN ANALYSIS OF THE NAVY’S AMPHIBIOUS WARFARE SHIPS FOR DEPLOYING MARINES OVERSEAS”

Nov 2011, p.8



Single Naval Battle

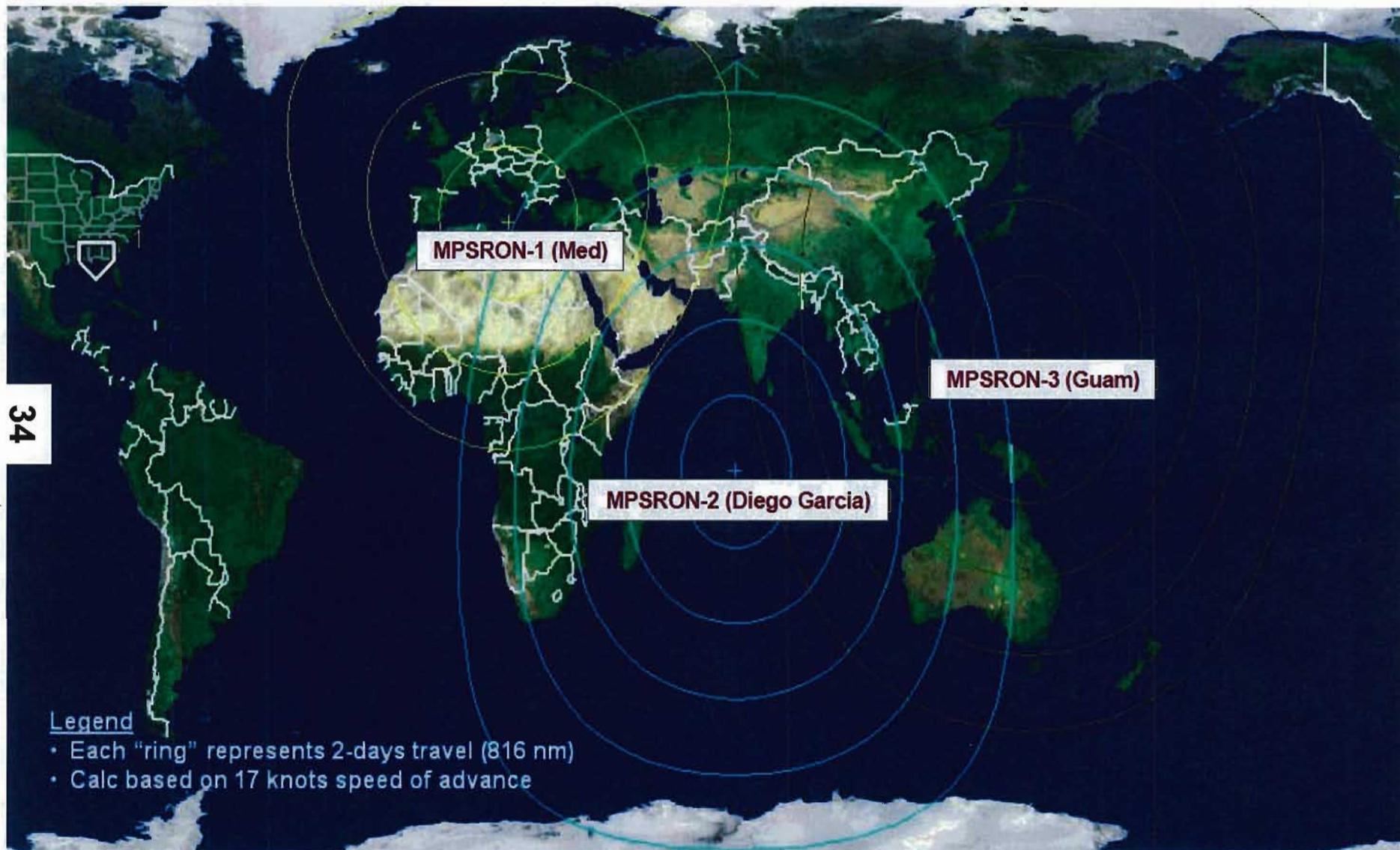


33

Single naval battle concept combines Navy and Marine Corps capabilities to apply scalable force with flexibility and precision

Source: Brief given by RADM M. Conner, Director, Naval integration Group to Marine Corps Command and Staff College, March 7, 2012

Current MPSRON Laydown and Response Times





22 MEU

General Cargo (Standard Containers)



A portion of the MEU's 20' ISO containers and ~195 QUADCONs staged at Morehead City, NC awaiting onload to BATAAN ARG

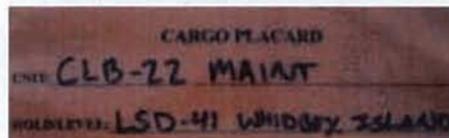
35





22 MEU

General Cargo (Ground)



A sample of the hundreds of miscellaneous pallets and containers staged for loading onto BATAAN ARG shipping

36





USS BATAAN

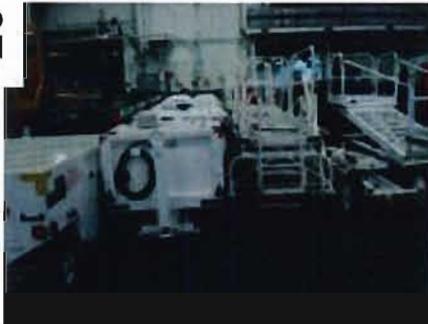
Hangar Bay



•In addition to the 38 QUADCONS and other equipment pictured on this slide, the stowage plan included one MV22, one CH53, one AV8B, one UH1, one AH1 in the hangar bay (not yet loaded when these photographs were taken).



37



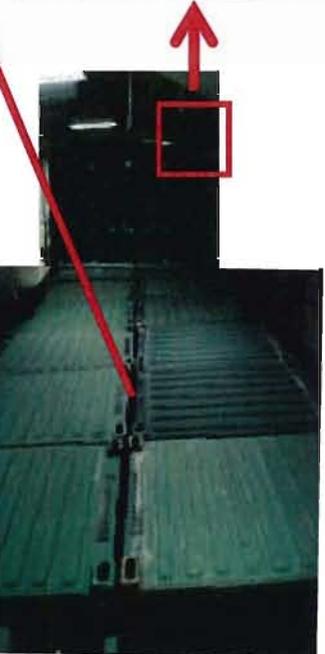


USS BATAAN

Upper Vehicle Stowage



38



“Trailer Farm” – Note tongue overlap (picture taken during onload) to maximize available space.



QUADCONs double stacked where possible to maximize available space.





USS BATAAN

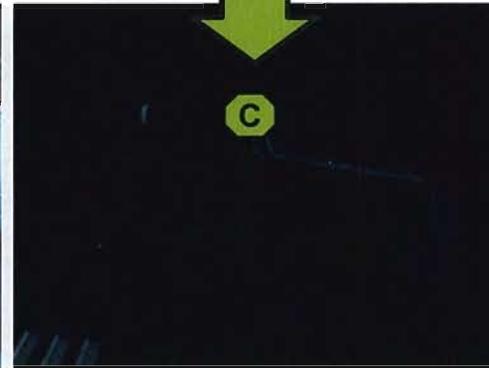
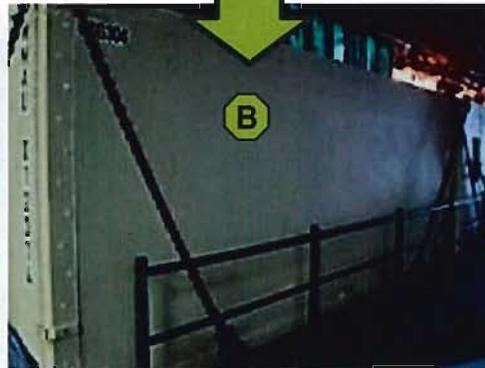
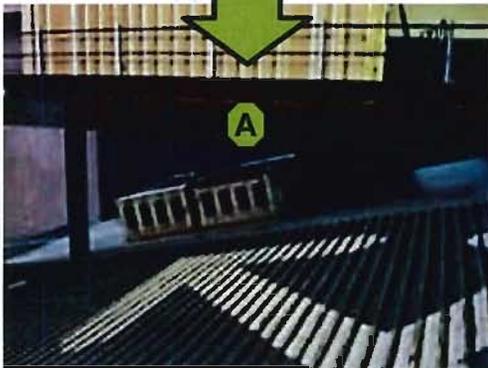
Upper Vehicle Stowage (Continued)



NSE 20' ISO container on the port side finger pier with two LCAC maintenance blocks stowed below

Two NSE 20' ISO containers on the starboard side finger pier

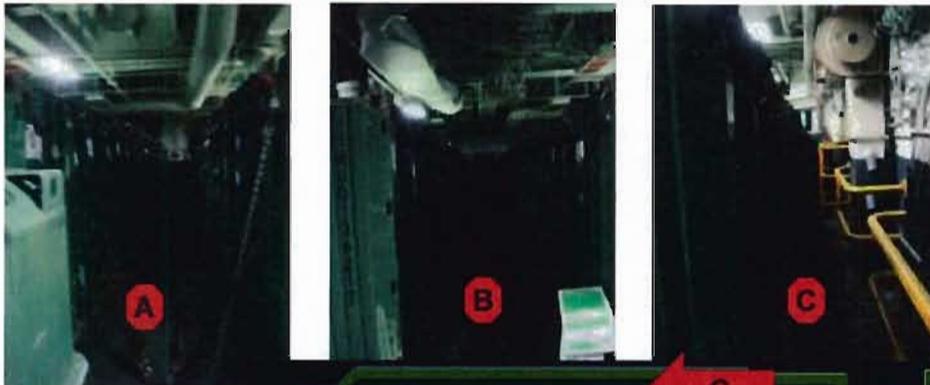
Two LCAC maintenance blocks stowed below the starboard side finger pier





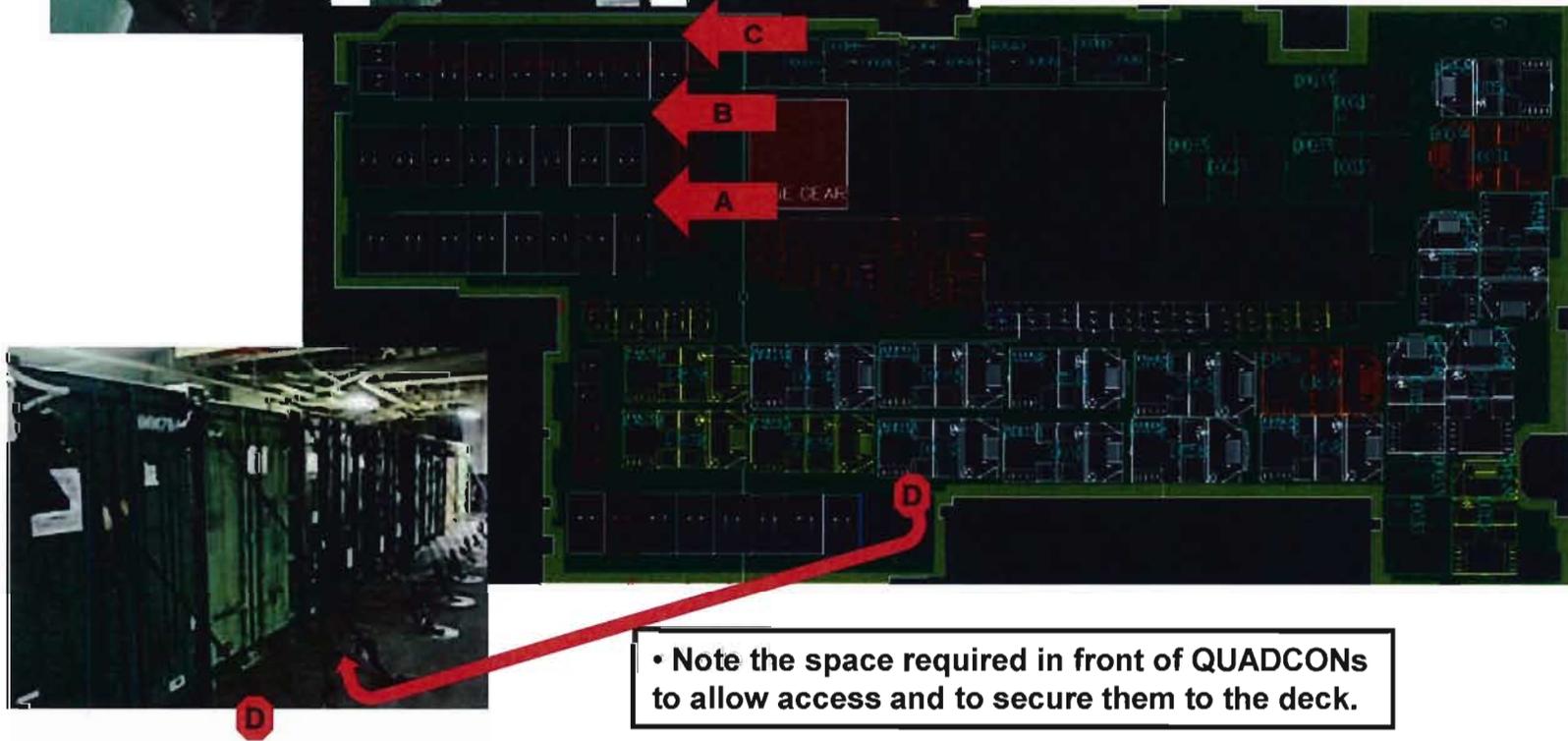
USS BATAAN

Lower Vehicle Stowage



• Less than 60% of the Lower “Vehicle” Stowage area is occupied by “vehicles”. The other 40% was filled with QUADCONs, PALCONs, and other miscellaneous containers.

40

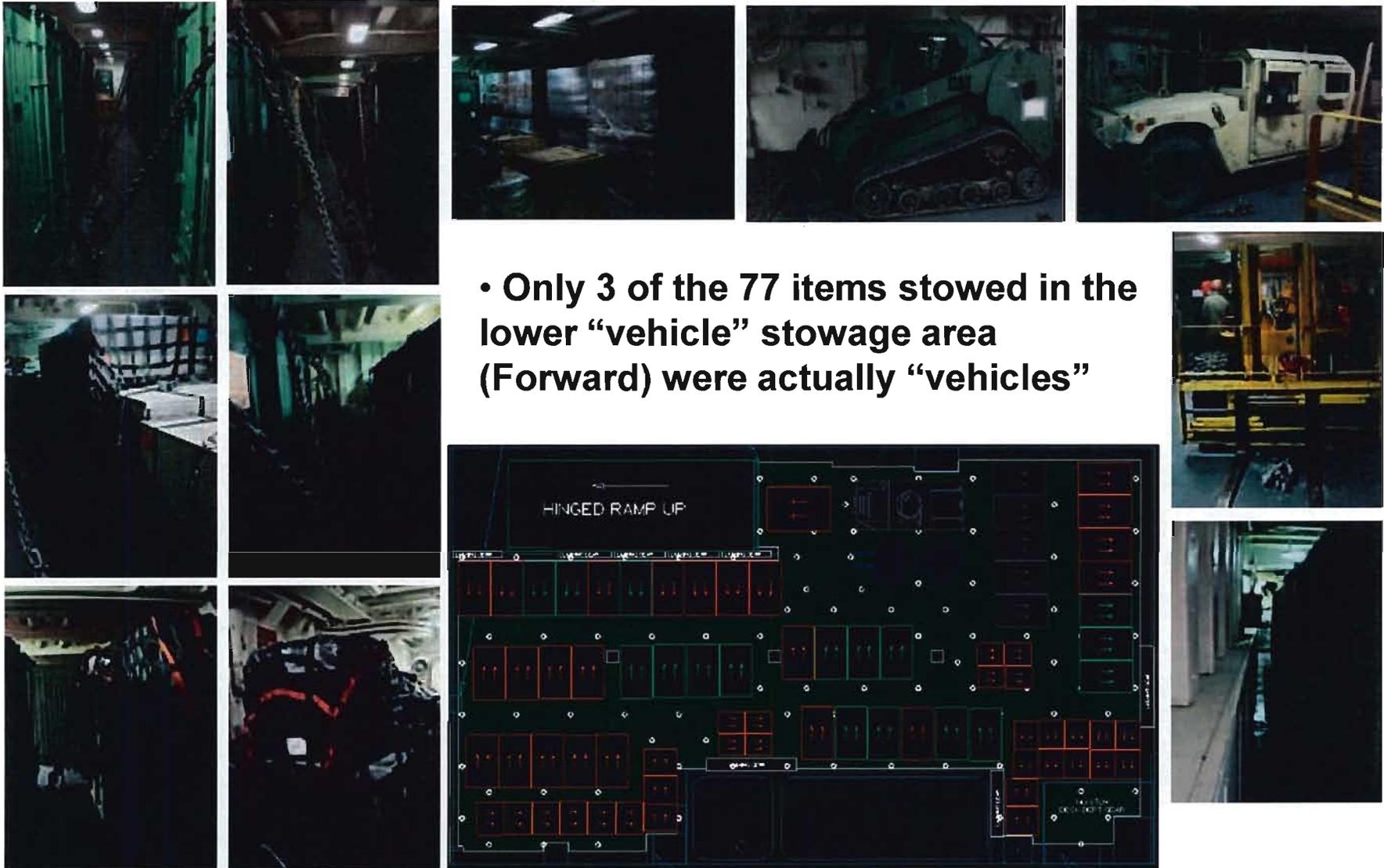


• Note the space required in front of QUADCONs to allow access and to secure them to the deck.



USS MESA VERDE

Lower "Vehicle" Stowage (Forward)

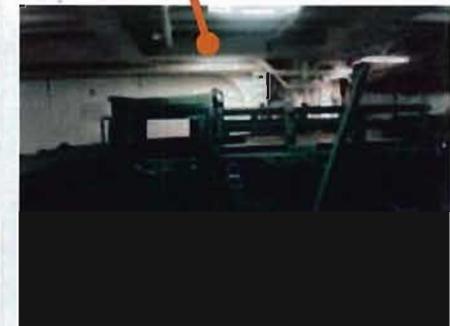
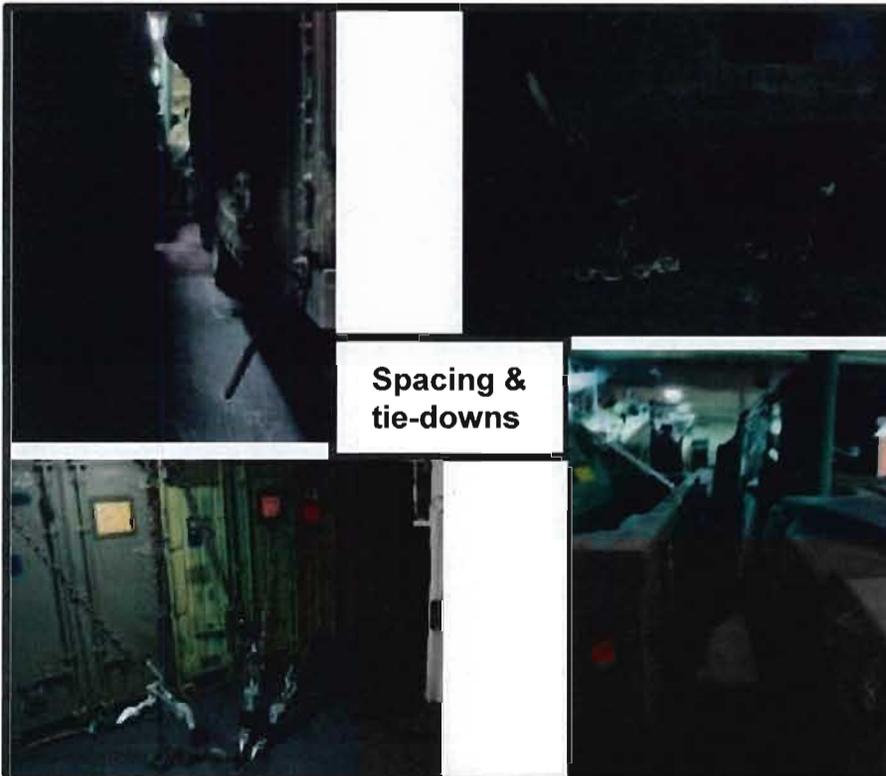


- Only 3 of the 77 items stowed in the lower "vehicle" stowage area (Forward) were actually "vehicles"



USS MESA VERDE

Lower "Vehicle" Stowage (Aft)



Lower Vehicle Stowage "Aft" contained 14 wheeled items and 34 containers/boxes/pallets



USS WHIDBEY ISLAND

Helo Deck (Spot #1)



“Helicopter” Deck loaded with artillery pieces, 7-ton trucks, and QUADCONs.



MV-22 "Hot Plates"
Not depicted on load plan

43



Figure 5: VERTREP / CONREP Example



Source: Navy.mil Photo # 100707-N-7948R-115 JAVA SEA (July 7, 2010)



Palletized Supplies in the T-AKE are configured in cargo nets and moved to the flight deck for VERTREP to the ship it is supporting



Source: Marines and Sailors Participating in Exercise BOLD ALLIGATOR (February 9, 2012)

44

The T-AKE transfers fuel, water and palletized cargo during CONREPs

Examples of traditional Container Operations Terminals (COTs)

45



Kuwait
Operation Iraqi Freedom



Kuwait
Operation Iraqi Freedom



Chinhae, ROK

Picture of the cabinets on T-AKE



46

Source:

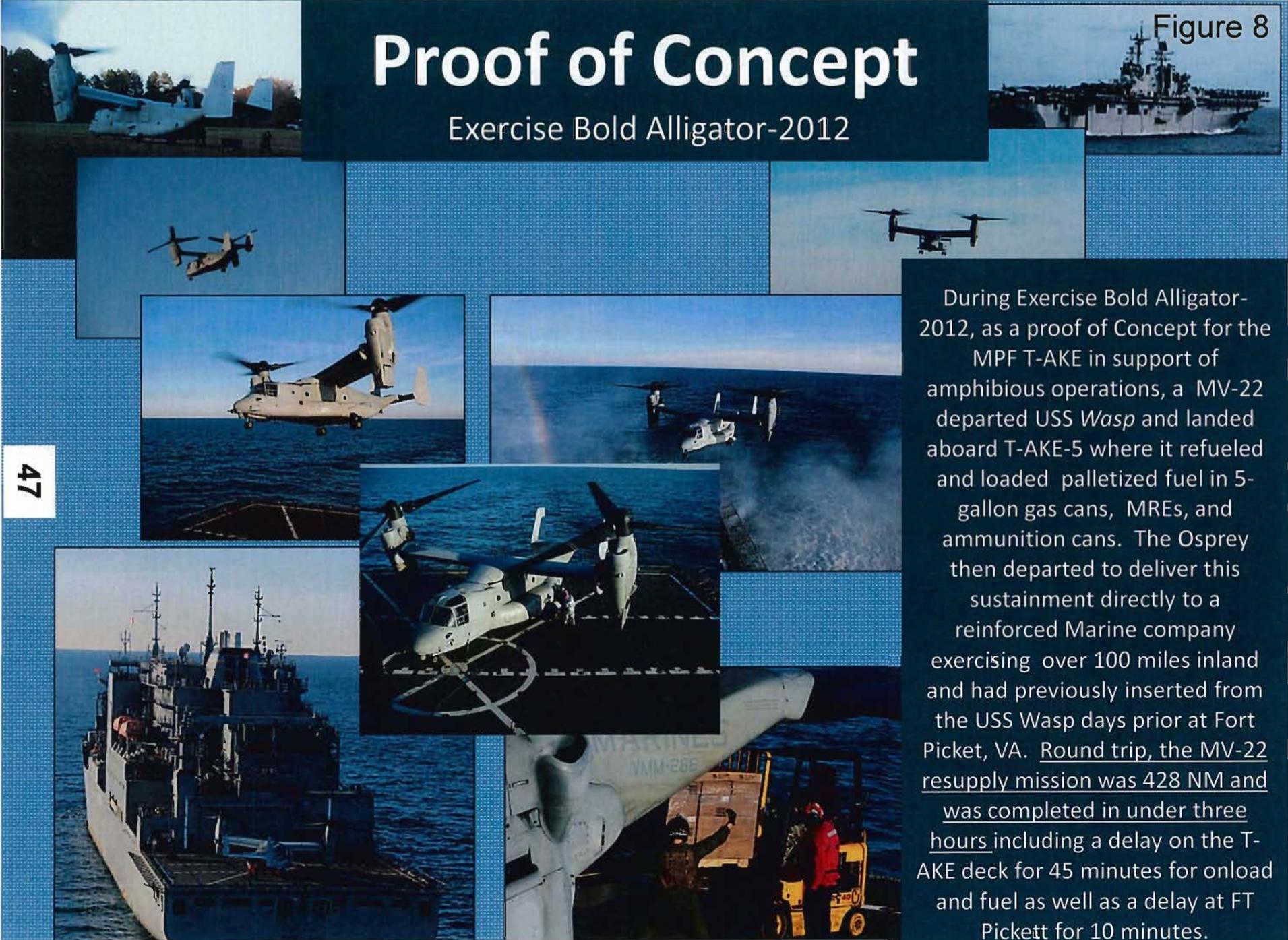
Photos provided by the Marines and Sailor's Participating in Exercise BOLD ALIGATOR-2012
Feb, 2012

Proof of Concept

Exercise Bold Alligator-2012

Figure 8

47



During Exercise Bold Alligator-2012, as a proof of Concept for the MPF T-AKE in support of amphibious operations, a MV-22 departed USS *Wasp* and landed aboard T-AKE-5 where it refueled and loaded palletized fuel in 5-gallon gas cans, MREs, and ammunition cans. The Osprey then departed to deliver this sustainment directly to a reinforced Marine company exercising over 100 miles inland and had previously inserted from the USS *Wasp* days prior at Fort Picket, VA. Round trip, the MV-22 resupply mission was 428 NM and was completed in under three hours including a delay on the T-AKE deck for 45 minutes for onload and fuel as well as a delay at FT Pickett for 10 minutes.

Figure 9
(Page 2 of 2)

JMPS PRODUCT

Route1.jrt : Path1		Airports													
Leg #	Turn Pt	Fix/Point	Latitude WGS84	MGRS Local	Datum	Elev	Aspd	Altitude	Temp	MH	TH	Leg Time	Leg Dist	Leg Fuel	GW
Leg Type	WayPt #	Desc	Longitude WGS84	FPM Mode	MSA	MV	Bank	Wind	FF	MC	TC	Clock Time (Z)	Total Dist	Avail Fuel	
Departure	1	LHD	N 34 18.922	18S UC 29590 98677	WGE	0 FT		5500M	4C						45926
		.Refuel	N 34 18.922	18S UC 29590 98677	WGE	0 FT	N/A	5500M	4C	63	54	00+00+00	0.0		
		.On-load 10500 lbs	W 076 51.123			9.9W		0/0	0	63	54	00:00:00	0.0		
1	2		N 35 10.138	18S VD 60681 91866	WGE	0 FT	200C	5500M	4C	63	54	00+24+04	86.9	-1065	44861
Cruise			W 075 25.907	Level Flight APLN	0	10.9W		0/0	2654	63	54	00:24:04	86.9	9435	
49	3		N 36 35.970	18S VF 39467 50659	WGE	0 FT	200C	5500M	4C	3	352	00+23+59	86.5	-1053	43808
			W 075 40.608	Level Flight APLN	0	11.1W		0/0	2635	3	352	00:48:03	173.4	8382	
		.Refuel	N 36 35.970	18S VF 39467 50659	WGE	0 FT	N/A	5500M	4C	3	352	00+00+00	0.0		
		.On-load 118 lbs	W 075 40.608		0	11.1W		0/0	0	3	352	00:48:03	173.4		
3	3	T-AKE	N 36 35.970	18S VF 39467 50659	WGE	0 FT	OG	5500M	4C	3	352	00+45+00	0.0	-1085	43926
Idle			W 075 40.608	MANUAL	0	11.1W		0/0	1447	3	352	01:33:03	173.4	7415	
4	4	KORF/A	N 36 53.677	18S UF 92970 83855	WGE	26 FT	200C	5500M	4C	316	305	00+08+33	30.9	-371	42470
Cruise		NORFOLK INTL	W 076 12.073	Level Flight APLN	0	10.8W		0/0	2606	316	305	01:41:36	204.3	7044	
5	5		N 37 00.026	18S TF 37559 98987	WGE	259 FT	200C	5500M	4C	286	275	00+23+22	84.3	-1010	41460
Cruise			W 077 56.954	Level Flight APLN	0	9.8W		0/0	2594	286	275	02:04:57	288.6	6034	
6	5		N 37 00.026	18S TF 37559 98987	WGE	259 FT	OG	5500M	4C	284	274	00+10+00	0.0	-241	41219
Idle			W 077 56.954	MANUAL	0	9.8W		0/0	1447	284	274	02:14:57	288.6	5793	
7	6	KNCA/A	N 34 42.506	18S TD 76566 43419	WGE	26 FT	200C	5500M	4C	179	170	00+38+40	138.5	-1655	39564
Cruise		NEW RIVER MCAS	W 077 26.380	Level Flight APLN	0	9.6W		0/0	2568	179	170	02:53:37	428.1	4138	

HMMWV Embarked aboard T-AKE-5



50

Vehicle in a Cargo Elevator



Vehicle exiting to Weather Deck

Vehicle below decks in a Cargo Hold



Table 1: T - AKE Cost / Steaming Time Data
Source: Mr. Richard Myers, Headquarters Military Sealift Command-PM3, 02 Feb 2012

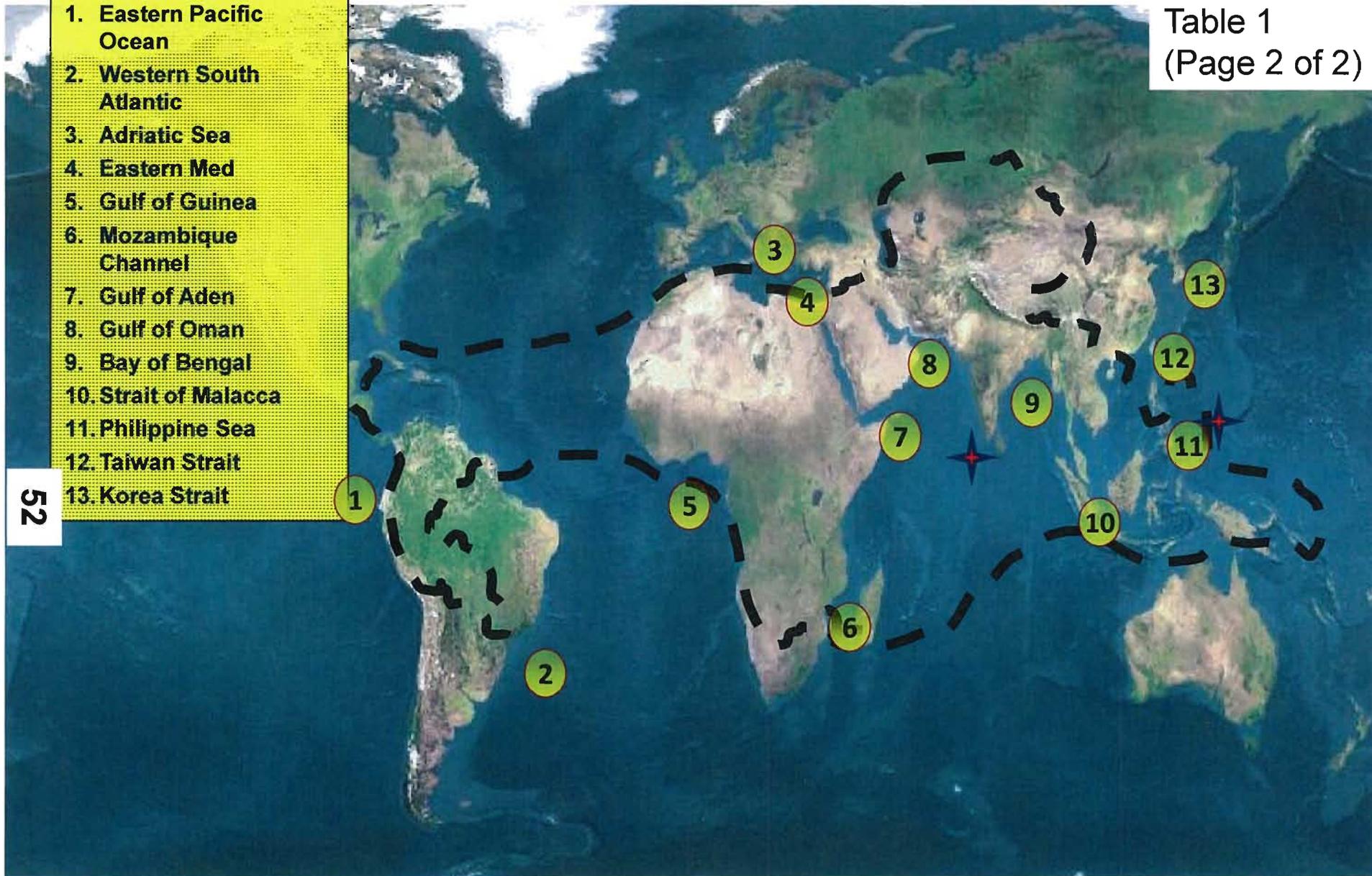
From:	To: Diego Garcia	Travel Time	\$ Fuel Cost	To: Guam	Travel Time	\$ Fuel Cost
	Nautical Miles	in Days	USD	Naut. Miles	In Days	USD
1 Eastern Pacific Ocean (Fiji)	6,620	19.70	1,226,935	2,853	8.49	528,768
2 Western South Atlantic (Recife)	6,745	20.07	1,250,102	11,008	32.76	2,040,196
3 Adriatic Sea (Split)	4,744	14.12	879,242	8,864	26.38	1,642,832
4 Eastern Med (Haifa)	3,683	10.96	682,598	7,786	23.17	1,443,039
5 Gulf of Guinea (Sao Tome)	5,830	17.35	1,080,518	10,088	30.02	1,869,686
6 Mozambique (Pemba)	2,190	6.52	405,889	6,964	20.73	1,290,691
7 Gulf of Aden (Aden)	2,095	6.24	388,282	6,211	18.49	1,151,132
8 Gulf of Oman (Gwader)	1,992	5.93	369,192	5,660	16.85	1,049,011
9 Bay of Bengal (Thanlyn)	1,887	5.62	349,732	3,276	9.75	607,166
10 Strait of Malacca	1,979	5.89	366,783	2,799	8.33	518,760
11 Philippine Sea (Mariana Islands)	3,651	10.87	676,668	1,131	3.37	209,617
12 Taiwan Strait	3,965	11.80	734,864	1,452	4.32	269,110
13 Korea Strait	4,678	13.92	867,009	1,589	4.73	294,501

Based on 14 kt Economical speed and 1.12 BBL's per NM at \$165.48 per barrel

1. Eastern Pacific Ocean
2. Western South Atlantic
3. Adriatic Sea
4. Eastern Med
5. Gulf of Guinea
6. Mozambique Channel
7. Gulf of Aden
8. Gulf of Oman
9. Bay of Bengal
10. Strait of Malacca
11. Philippine Sea
12. Taiwan Strait
13. Korea Strait

Table 1
(Page 2 of 2)

52



The dotted line represents the "Arc of Instability"

Source: Prepositioning Road Map - 2025, July, 2009 p.48"

Appendix A: Landing Forces Operational Reserve Materiel (LFORM) Pallet Spaces

Source : Information Extracted from COMNAVSURFPAC/LANT INST 4080.1G, August 11, 2011

		Pallet Spaces
Class I (Rations)	Meals Ready to Eat (MREs) are divided between the LHD-1, LHA-1, LPD-4 and LPD-17 class ships in the Amphibious Ready Group (ARG)	188
Class III (Bulk, Packaged Petroleum, Oil and Lubricant (POL))	Packaged POL (per LHD-1, LHA-1, LPD-4 and LPD-17 class ships in the ARG)	
	Oil, Lube, SAE 10	4
	Oil, Lube, SAE 30	10
	Oil, Lube, SAE 15W40	3
	Oil, Lube SAE 90	5
	Fulid, Hydraulic (Dextron III)	2
	Grease GAA	5
	Anti-Freeze	2
	Brake Fluid	1
	Acetylene Bottle	1
	Argon Bottle,	1
	Oxygen Bottle	1
Nitrogen Bottle	1	
		<hr/> 36
		72
Class IV (Construction/Field Fortification)	A total of 18 multipacked pallets are embarked on each LHD-1, LHA-1, LPD-4 and LPD-17 class ships in the ARG*	20
	Post, Fence, 60"	
	Post, Fence, 32"	40
	Wire, Concertina	6
	Wire, Barbed	8
		<hr/> 18*
		36
Class V(W) (Ground Ammunition, LFORM and Marine Training Allowance (MTA))		
Class V(A) (Mission Load Allowance (MLA) and Sustainment Training Package (STP))	Further Analysis is needed to determine the approximate number of pallet spaces currently required to load Class V. However, the LFORM Instruction issued by COMNAVSURFPAC/LANT provides a detailed break down of the type and quantity of ammunition loaded aboard the ship's magazines in the ARGs.	



Dry Cargo / Ammunition Ship
Lewis and Clark (T-AKE 1) Class



Lewis and Clark (T-AKE 1) Class Dry Cargo/Ammunition Ship FACT SHEET

Mission

Deliver ammunition, provisions, stores, spare parts, potable water and petroleum products to carrier battle groups and other naval forces, serving as a shuttle ship or station ship.

Principal Characteristics

Length Overall.....	(689 ft.)	210.0M
Length between Perpendiculars.....	(654.7 ft.)	199.55M
Beam, Molded.....	(105.6 ft.)	32.2M
Draft, Design.....	29.9 ft.)	9.12M
Draft, Scantling.....	(31.2 ft.)	9.50M
Displacement at Design Draft.....		41,000 MT

Speed and Endurance

- Design Speed—20 knots @ design draft and 80% propulsion MCR
- Range—14,000 NM @ design speed and draft

Propulsion and Power Generation Plant

- Integrated propulsion and ship service electrical 6.6 kV distribution system
- Four FM/MAN B&W 9L and 8L 48/60 diesel generators with total installed power of 35.7 MW
- Propulsion plant meets American Bureau of Shipping R1 redundancy requirements
- Twin synchronous, variable speed, reversible, double-wound, Alstom propulsion motors with brush/slip-ring excitation, each rated at 11,262kW at 120 rpm and mounted in tandem
- Single fixed-pitch propeller

Accommodations

Berthing, messing and leisure and community spaces for a combined Military Sealift Command naval and civilian complement of 172, plus 25 spares

Cargo Capacities

Dry cargo	6,675 MT
Cargo fuel.....	3,242 MT (23,450 bbl)
Cargo potable water.....	200 MT (52,800 gal)

Cargo Systems

- Two multi-purpose cargo holds for dry stores and/or ammunition
- One cargo hold for freeze, chill and/or dry stores
- Three specialty cargo and spare parts cargo holds
- Additional specialty cargo spaces on 01 Level
- Extensive cargo prestaging areas on Main Deck
- Lightweight portable cargo dunnage system
- Five cargo fuel tanks plus one slop tank
- Two cargo potable water tanks
- Three dry cargo and one liquid cargo Connected Replenishment (CONREP) stations on each side
- Vertical Replenishment (VERTREP) by aircraft, using flight deck on Main Deck
- Capability for simultaneous operation of five CONREP stations, or three CONREP stations plus VERTREP
- Hangar and support facilities for two embarked military or commercial helicopters
- Four 5 MT cranes for loading and offloading pierside or at anchorage
- Eight cargo elevators for moving cargo between Main Deck and stowage locations

Special Features

- Firefighting systems include: seawater sprinkling and dewatering systems in cargo holds
foam system for flight deck, hangar and machinery space bilges
FM-200 clean agent fire extinguishing system for machinery spaces and certain other spaces
- Naval communications suite
- Air-conditioned cargo holds
- Bow thruster
- Extensive pollution control systems, including: ballast water exchange
cargo fuel vapor recovery
main and auxiliary diesel exhaust meet MARPOL Annex VI guidelines



Appendix C: Draft Prepositioning Objective (PO) for T-AKE-1 (USNS *Lewis & Clark*)

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Source: Provided by Major Daniel Atkinson, Maritime Prepositioning Force Officer, Headquarters Marine Corps, 01 June 2011

ITEM ID	DESCRIPTION	LEWIS & CLARK
B0027	MOBILE ELECTRIC POWER DISTRIBUTION -REPLACEMENT, INDOOR MODE	3
B0028	MOBILE ELECTRIC POWER DISTRIBUTION -REPLACEMENT, OUTDOOR MOD	3
B0030	MOBILE ELECTRIC POWER DISTRIBUTION -REPLACEMENT 30KW PANEL	4
B0031	MOBILE ELECTRIC POWER DISTRIBUTION -REPLACEMENT 100KW PANEL	1
B0570	DRUM, FABRIC, COLLAPSIBLE, LIQUID FUEL, 500 GAL	8
B0571	DRUM, FABRIC, COLLAPSIBLE, WATER, 500 GAL	6
B0676	WATER POINT SUPPLY SYSTEM, FWD AREA	1
B0730	GENERATOR SET, 3KW/60HZ, TQG (MEP831)	2
B0953	GENERATOR SET, 30KW/60HZ, TQG (MEP805)	2
B1021	GENERATOR SET, 60KW/60HZ, TQG (MEP806)	4
B1045	GENERATOR SET, 100KW, 60HZ, SKID-MTD (MEP 007)	2
B1135	REFUELING SYSTEM, EXPEDIENT, HELO	1
B1140	HYPOCHLORINIZATION UNIT	1
B1570	PUMP ASSEMBLY, EXPEDIENT REFUELER, FUEL DISPENSING	6
B1582	PUMP WATER 350 GPM	1
B1620	PUMP SET, 125 GPM, 50 FT HEAD	7
B2131	TANK FARM INTERCONNECTION SET, DUAL TANK	2
B2133	TANK FARM INTERCONNECTION SET, 4" HOSE	1
B2134	TANK FARM INTERCONNECTION SET, 2" HOSE	3
B2135	TANK FARM INTERCONNECTION SET, 4" DISCHARGE HOSE	1
B2136	TANK FARM INTERCONNECTION SET, HOSE NOZZLE	2
B2138	TANK FARM INTERCONNECTION SET, 350 GPM PUMP	1
B2139	TANK FARM INTERCONNECTION SET, 125 GPM PUMP	1
B2170	TIE DOWN KIT, F/USE W/500 GAL	2
B2605	PURIFICATION SYSTEM, WATER, TACTICAL	2
B2605A	RECIRCULATION KIT WATER	1
B2632	WATER TANK 20K	4
B2730	YOKE, TOWING AND LIFTING	2
C0044	COMMAND POST SYSTEM, MODULAR	7
C0045	COMMAND POST SYSTEM, MODULAR	15
C0062	COAT, CHEMICAL UNIVERSAL	8707
C0063	TROUSERS, CHEMICAL UNIVERSAL	8707
C2010	APRON, PROTECTIVE, TOXICOLOGICAL AGENTS	116
C2130	COVER, FOOTWEAR, PROTECTIVE, CHEM (OVERBOOTS)	8707
C2150	CHEMICAL GLOVES	8707
C2200	REACTIVE SKIN DECON	726
C3409	(EMI) HARDENED STRINGABLE TWO LIGHT KIT (TLK)	436
C3415	TENT SYSTEM, TAN, GP, MODULAR (MGPTS)	96
C4266	ULCANS DESERT RADAR SCATTERING (MPS-2 ONLY)	769
C4546	CONTAINER, BEVERAGE, 3 GAL, PORTABLE, RUGGEDIZED	78
C4881	CONTAINER, FOOD, 7 GAL, PORTABLE, RUGGEDIZED	74
C6388	TARPAULIN, 26 FT X 22 FT	70
C6415	ENCLOSURE, MAINT, LTWT (LME)	26
C8600	AMAL 618, LABORATORY EQUIPMENT	1
C8604	AMAL 619, LABORATORY CONSUMABLES	2
C8614	AMAL 627, X-RAY EQUIPMENT	1
C8624	AMAL 631, SHOCK SURGICAL TEAM/TRIAGE EQUIPMENT	1
C8628	AMAL 632, SHOCK SURGICAL TEAM/TRIAGE CONSUMABLES	2
C8630	AMAL 633, ACUTE CARE WARD EQUIPMENT	1
C8634	AMAL 634, ACUTE CARE WARD CONSUMABLES	2
C8638	AMAL 635, AID STATION EQUIPMENT	4
C8640	AMAL 636, AID STATION CONSUMABLES	8
C8650	AMAL 639, OPERATING ROOM EQUIPMENT	1
C8654	AMAL 640, OPERATING ROOM CONSUMABLES	2
J3075	LATRINE BOX, PREFABRICATED	1
J3370	WIRE ROPE STEEL 3/4 IN	100

ITEM ID	DESCRIPTION	LEWIS & CLARK
JZ012	40P NAILS	18
JZ022	8P NAILS	18
K4031	BAG, STERILIZING, WATER, 36 GAL	9
K4128	CAN, GASOLINE, MILITARY, SCREW CAP	635
K4236	COT, FOLDING, ALUMINUM AND NYLON	10
K4250	CONTAINER, WATER, PLASTIC	1120
K4275	DETERGENT, GENERAL PURPOSE	30
K4285	DISINFECTANT, GERMICIDAL AND	6
K4286	DISPENSING PUMP, HAND DRIVEN	12
K4287	DISPENSING PUMP, HAND DRIVEN	27
K4305	DRY CHEM FIRE EXT	35
K4319	EXTINGUISHER, FIRE, CARBON DIOXIDE, 15LB	42
K4321	EXTINGUISHER, FIRE, DRY	179
K4324	EXTINGUISHER, FIRE, WATER,	22
K4335	FAUCET, SINGLE, SELF-CLOSING	27
K4375	GLOVE, WORK, MEN'S, BARBED WIRE HANDLER'S	114
K4385	GLOVE, LEATHER, WORK, LINEMAN'S	97
K4390	GOGGLES INDUSTRIAL	10
K4410	REPAIR KIT, TENTAGE	22
K4485	INSECTICIDE, 0.6% PYRETHRUM AEROSOL, 12 OZ	17
K4520	MACHETE, HANDLE, RIGID	96
K4615	OILER, HAND, 12 OZ	5
K4655	PANEL MARKER, FLUORESCENT, RED	82
K4660	PANEL MARKER, FLUORESCENT, YELLOW	89
K4665	PANEL MARKER, FLUORESCENT, RED AND ORANGE	37
K4675	PANEL MARKER SET	5
K4700	PAPER, TOILET, ROLL TYPE	24
K4730	PLOTTING SHEETS, PLASTIC, 1000	11
K4736	PUMP, BUCKET	5
K4765	RODENTICIDE, ANTICOAGULANT, 6	5
K4805	SEAL, STEEL STRAPPING	10
K4806	SEALER, STEEL STRAPPING, HAND	12
K4807	SEALER, STEEL STRAPPING	4
K4810	SHEATH, MACHETE	96
K4850	LAUNDRY SOAP	12
K4898	SPRAYER INSECTICIDE	11
K4901	STAND, MAINT, AUTOMOTIVE AXLE,	7
K4910	STEEL STRAPPING, FLAT	6
K4941	STOVE, MULTIFUEL, INDIV/SQUAD	556
K4947	STRETCHER, STEEL STRAPPING,	12
K4948	STRETCHER, STEEL STRAPPING 1-1/4 - 2 IN	6
K4959	TABLE, FOLDING LEGS, TOP, WOOD	50
K4976	TARPAULIN, 14 FT X 6 FT	12
K4978	TARPAULIN, 17 FT X 12 FT	8
K5013	TRUCK, HAND, STEEL STRAPPING COIL	1
K5014	TRK, HAND, TWO-WHEELED	2
K5016	CLEANER, VACUUM	4
KZ022	STEEL STRAPPING, FLAT .75"	12
U3010	SAND BAGS	1000
U3030	WIRE, BARBED, 1320 FT SPOOL	90
U3040	WIRE, BARBED, GP, CONCERTINA	100
U3180	PIPE CULVERT 18"	40
U3190	PIPE CULVERT 36"	60
U3200	POST, FENCE, METAL, 2'	2705
U3210	POST FENCE METAL 32"	1383
U3220	POST FENCE METAL 5 FT	2995
U3225	POST, FENCE, METAL, 8', F/BARBED WIRE	400

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