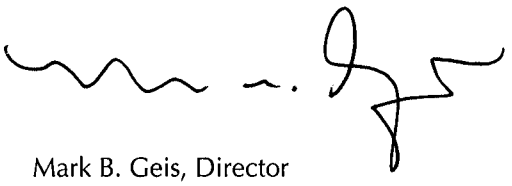
CRM D0007800.A1/Final
February 2003

Deriving Missions for the Future NALMEB Program

Kim Deal • Annemarie Randazzo
Stephen Guerra

4825 Mark Center Drive • Alexandria, Virginia 22311-1850

Approved for distribution: February 2003



Mark B. Geis, Director
Naval Operations and Support Team
Integrated Systems and Operations Division

This document represents the best opinion of CNA at the time of issue.
It does not necessarily represent the opinion of the Department of the Navy.

Distribution limited to DOD agencies. Specific authority: N00014-00-D-0700.
For copies of this document call: CNA Document Control and Distribution Section at 703-824-2123.

Contents

Summary

The Norway Air-Landed Marine Expeditionary Brigade (NALMEB) prepositioning program is out of date. Originally designed for the Cold War, the program has only changed a little in response to evolving U.S. security interests [1]. To realign the program with the U.S. defense strategy, the Deputy Commandant, Plans, Policies and Operations (DC, PP&O) Headquarters Marine Corps (HQMC) asked CNA to analyze the NALMEB program. This interim report completes task 5, developing potential missions and cross-walking the missions to required operational capabilities.

The NALMEB program has potential. We recommend that the future program be tailored to support mid- to low-intensity conflicts in the EUCOM and CENTCOM areas. This change in mission makes the future NALMEB expeditionary as well as capability-based—designed to support a range of missions in a variety of locations. Appropriate mid- to low-intensity conflicts include disaster relief and humanitarian assistance as well as aspects of peace operations, terrorism response operations and augmentation to combat operations.

We derive these missions from a set of desirable traits, applying the traits to a range of military operations. Desirable traits for the future NALMEB include that the equipment supports a range of military operations, can support either one 12,000 to 14,000 MAGTF (Marine Air Ground Task Force) or several smaller MAGTFs, and can support operations throughout EUCOM and CENTCOM. These traits are those generally considered during course of action development during the Marine Corps planning process (type of operation, forces, time, and resources). In addition, future missions should take advantage of NALMEB's selective and scalable equipment withdrawal capabilities.

We derived the future NALMEB missions using a mission framework. The framework provides a decision logic (considering location, force

requirements, and operational environment) for determining which mission categories best fit NALMEB traits. While each operation presents unique challenges, the framework allows us to provide a strategic level assessment of what missions seem most (or least) appropriate for NALMEB. We applied the framework to a variety of past operations and future scenarios to further define appropriate missions, illustrating that the future NALMEB can either complement or offer an alternative to MEU(SOC) and/or MPF use.

A redesigning of NALMEB to support more missions outside Norway is likely to impact the equipment requirements. We considered equipment adjustments for low end missions, compensating for the absence of Norwegian combat service support, and improved combat capability. For low end missions, we focused on humanitarian and disaster relief, and found that NALMEB may need additional engineering and transportation assets. In particular, reliance on the fly-in echelon for some key engineering (generators and container handlers) and motor transportation (5-ton trucks and LVS trailers) equipment requires further consideration.

Deploying out of Norway will eliminate support provided by the Norwegian Host Nation Support (HNS) Battalion, creating additional potential engineering and transportation equipment shortfalls. These shortfalls include heavy engineering equipment (excavator, drill rig, and back hoes) and some supplies, like fuel and POL (petroleum, oils, and lubricants).

Our mission framework assumes the future NALMEB will keep about the same level of combat power as today, suggesting heavy combat equipment will not be prepositioned. We used the 2015 MEB to illustrate the equipment requirements if this assumption is challenged. NALMEB shows many equipment shortfalls, including LAVs, tanks and AAVs, as well as the improved fires systems (EFSS and HIMARS).

The next steps in our analysis include cost and implementation considerations. We will estimate the costs associated with the current modernization plan, improved equipment capabilities for low end missions, improved engineering and transportation capabilities, and improved combat capability. Finally, we will develop an implementation plan and address some implementation issues.

Introduction

The DC, PP&O, HQMC asked CNA to analyze the NALMEB prepositioning program. Specifically, he asked us to determine the operational relevance, alternative uses, and potential future force structure of the program based on the strategic environment. After our first report, DC, PP&O asked us to change the study approach to take a more holistic look at the NALMEB program [1]. He asked us to take a closer look at the political implications of program change, develop potential missions, and address implementation issues for the future NALMEB. This report completes task 5, which is focused on developing potential missions and cross-walking the missions to required operational capabilities.

Background

NALMEB was established in 1981 by a bilateral memorandum of understanding (MOU) between the governments of Norway and the United States [2]. The MOU provided for an aviation-heavy, but otherwise light mechanized, fly-in MEB to reinforce Norway in case of potential Soviet aggression. To facilitate a rapid deployment, equipment and 30 days of supplies are prepositioned in climate-controlled caves in central Norway.

A striking feature of the NALMEB program is how little the program has changed in response to world events and changing U.S. interests [1]. Of note, both Norway and the U.S. approved out of area use for NALMEB in the mid-1990s, and some policy was published in 2001. Since then, NALMEB equipment and supplies have been used outside of Norway in exercises and operations. Even so, the program still retains much of its original Cold War focus. Recently, both parties have recognized the need to align the program with the current and future strategic environment. This openness to change, in particular

on the Norwegian side, provides the opportunity to adjust the program to support the U.S. strategic focus.

As stated in the bilateral MOU, the primary mission of NALMEB is to support the defense of Norway. The NALMEB program (management, procedures, force structure, and equipment) is tailored to support this mission. Our task is to determine what mission(s) the Marine Corps should use to tailor the future NALMEB program.

At a minimum, several entities have a stake in future mission development: HQMC (PP&O), as the executive agent; Marine Forces Europe (MFE), as the Marine component in EUCOM; and the Office of Defense Cooperation (ODC), U.S. Embassy, Oslo, as the Marine liaison with the Government of Norway. All agree that the future NALMEB should become more expeditionary and support a range of military operations, while still addressing the Norwegians concerns. As a result of recent bilateral discussions, one participate suggested the following for consideration as a new mission:

> NALMEB is tailored to provide a flexible, rapid, response force capable of meeting ***selected contingency requirements*** in NATO and for the combatant commanders.
>
> The reinforcement of Norway remains the cornerstone of NALMEB and Marine Corps prepositioning will continue to support our bilateral commitment.

Key to this statement is defining the scope of "selected contingency requirements." Once defined, the management, procedures, force structure, and equipment mix of the future NALMEB program can be tailored. This is the focus of our analysis.

Methodology

Our intent is to build missions for the future NALMEB that are both logical and reproducible, creating a new concept for NALMEB use. Our methodology calls for assumptions (discussed in later sections) in order to develop a strategic perspective. The assumptions should be challenged, allowing the concept for NALMEB employment and future missions to mature.

Events in 2001 shifted the U.S. military toward a capabilities-based philosophy, know as the 1:4:2:1 construct [3, 4]. In this construct, the U.S. military will keep a forward presence in four deterrent areas; execute two short, nearly simultaneous campaigns; and execute one decisive campaign while maintaining homeland security. Any future mission(s) for NALMEB should be capabilities-based (vice threat based), supporting the new military strategy while increasing the flexibility of the program. So, instead of focusing on current or projected threats, we considered the key traits needed for different types of missions and determined whether NALMEB could be designed to support those missions.

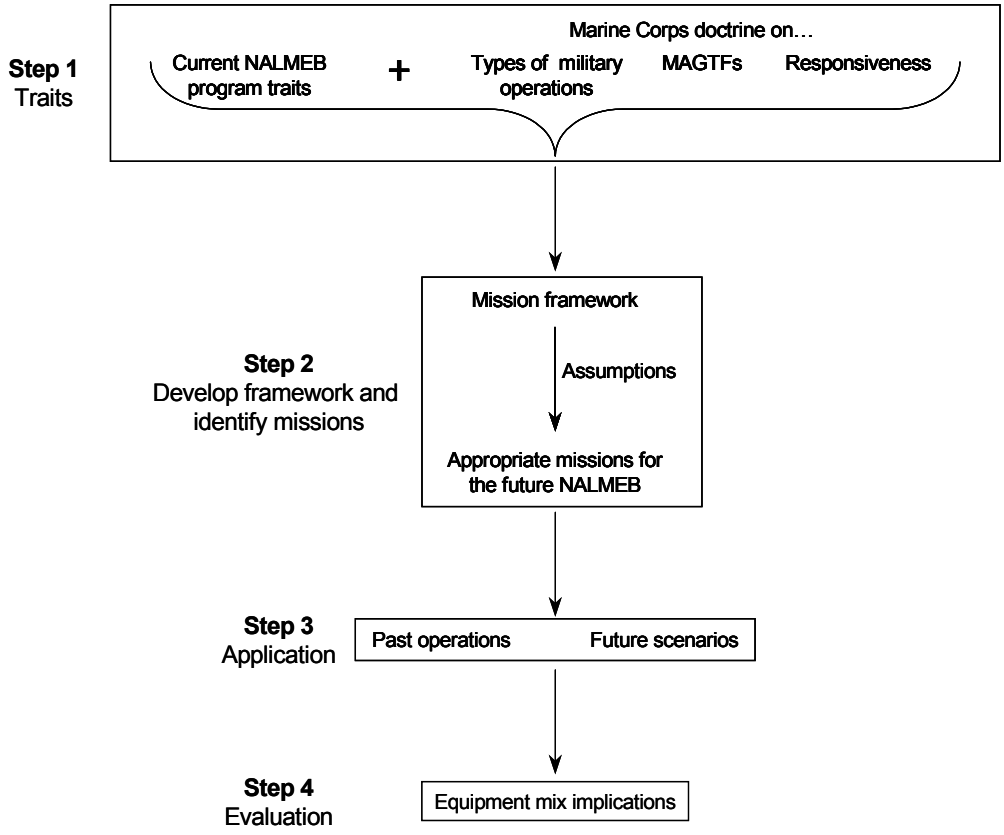
Our overall approach to mission development is to build on the positive attributes of the current program, think about how Marines are operationally employed, complement ongoing programs (such as MPF(F)), and remain relevant beyond 2015. An overview of our methodology is shown in figure 1.

Our first step was to identify current program traits and develop mission traits for the future NALMEB. We focused on current program strengths that can be exploited in the future. We developed mission traits from Marine Corps doctrine and historic operations. Our second step is to develop a framework for identifying future missions. The framework was built from the traits, creating a structured decision process for determining appropriate missions. We used the framework to identify the more suitable missions at the strategic level. Our third step was to illustrate our framework by applying it to OSD approved scenarios and past operations. Finally, we evaluated the mission options in terms of required operational capabilities, identifying potential equipment mix adjustments.

Assumptions

In developing potential NALMEB missions, we made the following assumptions about the future of the program:

Figure 1. Methodology



- Prepositioned equipment and supplies will remain in Norway.
- Norway is receptive to additions or changes to the primary mission and MOU.
- Norway is receptive to equipment and supply adjustments.

These assumptions are built on our understanding of the political constraints on the current NALMEB program, and are examined more closely in [5].

We also assumed that Marine forces would likely act as a component within a larger force, implying that NALMEB could work with joint or coalition forces. This assumption is built on our understanding of the Marine Corps role in recent operations, such as Operations Restore Hope, Noble Anvil and Enduring Freedom [6, 7, 8].

Overview

The remainder of this report is divided into five sections. In *Future mission traits*, we discuss existing traits and derive additional traits for the future NALMEB. In *Mission framework*, we develop a decision logic from the derived traits, to determine whether a given mission is appropriate for NALMEB. We apply the decision logic to general missions, providing a broad outline of appropriate missions for the future NALMEB. In *Framework applied*, we determine whether the future NALMEB would have been suitable for past Marine Corps operations. We also apply the framework to the approved Defense Planning Guidance illustrative planning scenarios and Dynamic Commitment scenarios. Since the scenarios are classified, we provide the results in a separate document [9]. In *Evaluation*, we consider the capabilities required for the most appropriate NALMEB missions and cross-walk the capabilities to major equipment. We close with *Future mission and next steps*, which gives our recommendations on future NALMEB missions and describes the next analytical steps.

Future mission traits

In this section, we show how we identified and derived traits for future NALMEB missions. Our approach was to find niches—potential shortcomings that can be met by NALMEB future. By considering the current NALMEB program, Marine Corps involvement in past operations, MAGTF size, and operation location, we developed the following future mission traits:

- Exploit selective and scalable withdrawal capability
- Design for mid- to low-intensity operations
- Support one medium sized or several small MAGTFs
- Support operations in land-locked or poor port regions.

Current program

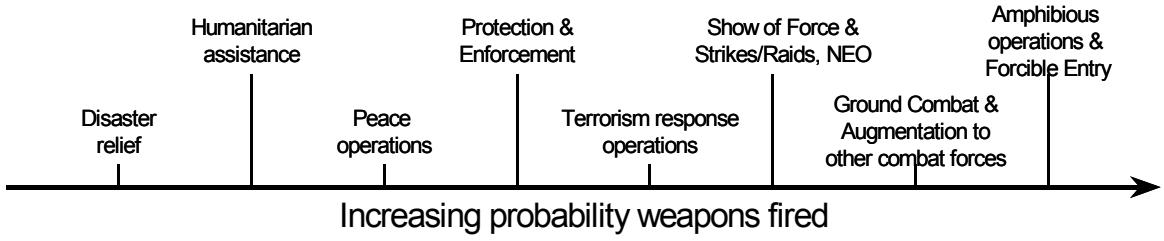
While NALMEB is currently tailored to a Cold War mission, aspects of the program lend themselves to the future expeditionary program. Specifically, the selective withdrawal of equipment is a valuable trait, allowing units to select the type and amount of equipment and supplies needed. Norway provides extensive host nation support services, including preventive and corrective maintenance. These traits, combined with the secure location and extensive infrastructure, should be leveraged by future missions.

Military operations

All U.S. stakeholders agree that NALMEB should support a range of military operations in the future, but the range is not defined. Depending on our approach to military operations, several different constructs could result. For example, a focus on the number of forces necessary, a focus on conflict length or a focus on conflict intensity would each result in a different operations construct. While all

military operations are intense, we focused on the likelihood that forces would be required to apply lethal force (figure 2).

Figure 2. Range of military operations



In figure 2, military operations are ordered by increasing probability that weapons will be fired. For example, lethal force is most likely to be applied by U.S. forces during amphibious and forcible entry operations, shown on the far right, and least likely to be applied during disaster relief, shown on the far left. The category of amphibious operations/forcible entry includes all amphibious operations (assault, raid, demonstration, and withdrawal). Ground combat/augmentation to other combat forces includes most of the remaining combat operations, including urban operations, enabling operations, airfield/port seizure, electronic warfare, psychological operations, expeditionary airfield operations, and tactical deception. Together, these two categories encompass combat operations.

Show of force, strikes and raids include tactical recovery operations and reconnaissance. Noncombatant evacuation operations (NEOs) are the evacuation of noncombatants from foreign countries in response to war, civil unrest, or natural disaster. We include this mission with strikes & raids, since many NEO's are quick response operations by forward deployed forces.

Terrorism response operations can range from support to civilian agencies after an attack to offensive operations against terrorist cells. Protection and enforcement operations include security of embassies, naval vessels and bases as well as sea lines of communication

protection and maritime intercept enforcement. Peace operations include both peacekeeping and peace enforcement.

Most modern conflicts fall into multiple categories. For example, consider Noble Anvil, the U.S. portion of the NATO operation in Kosovo, Allied Force. This operation combined intense air strikes (combat operations) with humanitarian assistance and peace operations.

Historically, the Marine Corps tends to support lower range and combat operations about equally. We classified 72 operations executed by the Marine Corps in either EUCOM or CENTCOM between 1970 and 2000 by the categories in figure 2.[1] The results, in table 1, show that 17 percent were combat operations and 25 percent were NEOs. The remaining 58 percent were mid- to low-intensity operations with about an equal split between the low-level (disaster relief, humanitarian assistance, and peacekeeping) and mid-level missions.

Table 1. Marine Corps EUCOM and CENTCOM operations, 1970-2000

Operation type	# of missions
Combat	12
Show of force & strikes/raids	12
NEO	18
Terrorism response operations	1
Protection & enforcement	7
Peace operations	8
Humanitarian assistance	5
Disaster relief	9
Total	**72**

The frequency of Marine Corps involvement in mid- and low-intensity missions suggests a possible niche, and NALMEB may be well suited to support these types of operations. Clearly, specific aspects of combat missions should not be excluded, since many conflicts (like

1. Data from the operations database maintained by HQMC(PP&O). The database generally classified the operations by the categories in figure 2.

Operation Enduring Freedom) have multiple phases, which include humanitarian assistance along with combat missions. NALMEB could fill the niche, by being a program tailored with an appreciation for the frequency and requirements of mid- to low-intensity missions. To further define future NALMEB missions, we next turn to force structure.

MAGTF size

NALMEB is designed to support a MEB sized force of about 12,000 Marines. Marine Corps doctrine envisions a number of MEB sized forces, with equipment and supplies provided from several sources. These forces, summarized in table 2, use maritime prepositioning and fly-in echelons to bring the equipment and forces together.

The MPF and MPF(F) MEBs should affect the design of future NALMEB missions. Today, the MPF program is a strategic asset, and generally used only when a MEB-sized force is required. Past operations illustrate two key issues in MPF operations. First, extensive host nation support facilities are required. Second, selective off-load is difficult and time consuming. While the MPF squadrons have been reconfigured with a MEU equipment slice, MPF use tends to be limited to major operations. Smaller operations and exercises are either supported with equipment from CONUS or executed by the MEU(SOC).

With fielding beginning as early as 2013, the MPF(F) concept addresses the shortcomings of the current program. The MPF(F) analysis of alternatives is ongoing, and operational capabilities defined in the mission needs statement include arrival and assembly of forces at sea, selective withdrawal of equipment, provision of logistics support and sustainment, and reconstitution at sea [10]. The baseline 2015 MEB was recently approved by the Marine Requirements Oversight Council (MROC) for planning purposes [11]. This MEB is about 14,400, and it is unclear whether MPF(F) equipment and supplies will be available for smaller operations.

The Marine Corps also deploys special purpose MAGTFs (SPMAGTF) and ACMs for specific missions. These units strategically

Table 2. MAGTF traits (MEF not included)

Type	Mission	CONOPS	Forces[a]	Equipment	Equipment Source
NALMEB	Defend Norway and reinforce the Northern Flank.	Advance party works with HNS to withdraw gear. Main party arrives in central Norway, assembles with gear, and deploys to N. Norway.	~12K MC, 700 NV[b]	Warfighting, designed for light infantry operations in cold weather.	Geo-prepositioned & fly-in.
MPF MEB[c]	Rapidly project/sustain combat power from a secure port/beach in support of a full range of missions.	Advance party offloads ships in secure, sufficient port near crisis area. Main party arrives at assembly area near port, accepts gear, and deploys to operation area.	~16K[d] or ~13.5 K MC, 750 NV[e]	Warfighting, designed for combat.	Maritime prepositioned and fly-in.
Amphibious MEB[c]	Forcible entry and project/sustain combat power from the sea in support of a full range of missions.	Assault echelon (AE) deploys aboard Navy amphibious shipping, remaining deploy as follow-on echelon. AE executes amphibious operations from ship to shore/objective.	~15K MC, ~900 NV	Warfighting, designed for forcible entry and combat.	Amphibious task force.
MPF(F) MEB[f]	Rapidly project/sustain combat power from the sea to enable joint maritime expeditionary operations in support of a full range of missions.	Under development. Main party arrives at sea assembly area, accepts gear, and deploys to operation area. Most support functions remain sea based.	~14K	Warfighting, evolving.	Maritime prepositioned and fly-in.
MEU(SOC)	Sea based, forward deployed presence that provides rapid response to multiple missions.	Marines and equipment are forward deployed with ARG and task organized to execute missions in as little as six hours.	~2200	Warfighting, designed for combat.	Amphibious ready group.
SPMAGTF	Task organized for specific missions.	Mission dependent.	250-2000[g]	Task specific.	CONUS & prepositioned
ACM[h]	Initial crisis response worldwide.	Fly (Marines and equipment) to a secure air field near crisis area.	2000	Task specific.	CONUS

a. Marine Corps (MC); Navy (NV).
b. MCBUL 3502, *Norway Air-Landed Marine Expeditionary Brigade Force List,* May 2001.
c. MCCDC. *Marine Expeditionary Brigade (draft).* Feb 2000.
d. Department of Navy. *Decisive Power...Global Reach: Naval Amphibious Warfare Plan.* Jun 2002.
e. MCBUL 3501. *Maritime Prepositioning Force Marine Expeditionary Brigade Force List.* May 2001.
f. MCCDC. *Maritime Prepositioning Force for the 21st Century Mission Needs Statement.* May 2001.
g. MCDP 1-0. *Marine Corps Operations.* Sep 2001.
h. Air contingency MAGTF.

lift CONUS based equipment and supplies to the crisis area, indicating a possible opportunity for the future NALMEB. As we consider the future NALMEB, equipment and supplies prepositioned in Norway could be used to support several small Marine MAGTFs, or one MEB, within a reasonable distance of Norway. This approach broadens the NALMEB mission beyond II MEF (who has the original defense of Norway mission), suggesting Marines from across the Corps could benefit from the program.

Distance

We are assuming that the NALMEB prepositioned equipment and supplies will still be stored in central Norway. The challenge for future missions will be to move the equipment from the stored location to the operation area in a timely manner. Since NALMEB future should complement MPF(F), we focused on regions that may not be easily accessible to MPF(F), and are within a reasonable distance of distribution hubs near Trondheim, Norway.

While the port requirements for MPF(F) vessels are unknown, the requirements for existing MPF ships are significant. The water depth must be 36 feet (11 meters) or deeper at low tide, the pier length must be 673 to 822 feet (203 to 250 meters), and the port basin must be large enough to allow vessels to turn around [12]. In addition, an airfield must be within 50 nautical miles (57.5 miles) of the port and have at least one runway 6,543 feet (1,994 meters) long in order to accommodate the fly-in echelon.

To identify regions that may not be accessible to MPF (and will likely not be accessible to MPF(F) either), we compared the water depth and pier length requirements to port characteristics in the EUCOM and CENTCOM AOR. While most of the European, Middle Eastern and Persian Gulf regions are accessible, large areas of Africa have insufficient port structure for MPF operations (details in [9]).

Land-locked regions are not readily accessible to any MAGTF, MPF and MEU(SOC)'s included. Here, MPF (or the MEU(SOC)) must be off-loaded at a suitable port and the equipment and supplies transported inland. For MPF(F), the MAGTF will arrive and assemble at

sea before moving to the objective. Use of NALMEB equipment and supplies could offer more options. The equipment could be transported by commercial shipping, which could decrease the port requirements, depending on the vessel. (For example, some breakbulk and roll-on/roll-off vessels have drafts of 30 feet or less.) Depending on the destination, NALMEB equipment and supplies could also move by train, taking advantage of Europe's extensive rail system.

The NALMEB program has focused on distribution within Norway, and has only recently started supporting external exercises and operations. An early example of out of Norway use was Baltic Challenge 1997, a Partnership for Peace exercise held in Estonia [13]. For this exercise, 210 units of equipment from NALMEB were transported by rail and sea to Paldiski, Estonia. Records from Regional Headquarters South Norway show that the sea shipment took 4 days at about 15 knots, covering a distance of about 1,400 nm from Valsneset, Norway, to Paldiski [14].

Table 3 shows approximate distances for moving equipment and supplies from Trondheim to locations in EUCOM and CENTCOM by sea. For comparison, distances from Norfolk and San Diego are also included. To reach the Persian Gulf and eastern African countries, we calculated the sea route through the Mediterranean Sea and Suez Canal. Table 3 also shows approximately how long it takes for ships to travel to the destination, given a range of speeds. We used 15, 20, and 25 knots to represent the speeds available by commercial shipping, depending on the age of the vessel.

The time-distance relationships in table 3 allow us to estimate the maritime range of NALMEB. Figure 3 shows the approximate ranges NALMEB equipment and supplies can be moved to a port within three time windows—10, 15, and 20 days. These time estimates do not include loading or unloading times. As shown, Europe and North Africa can be easily reached from Trondheim within ten days. That is somewhat shorter than the deployment from Norfolk. Portions of the northeastern and northwestern African coast can be reached within 15 days. For northwestern Africa, the deployment time is about the same as or slightly longer than the deployment time from Norfolk.

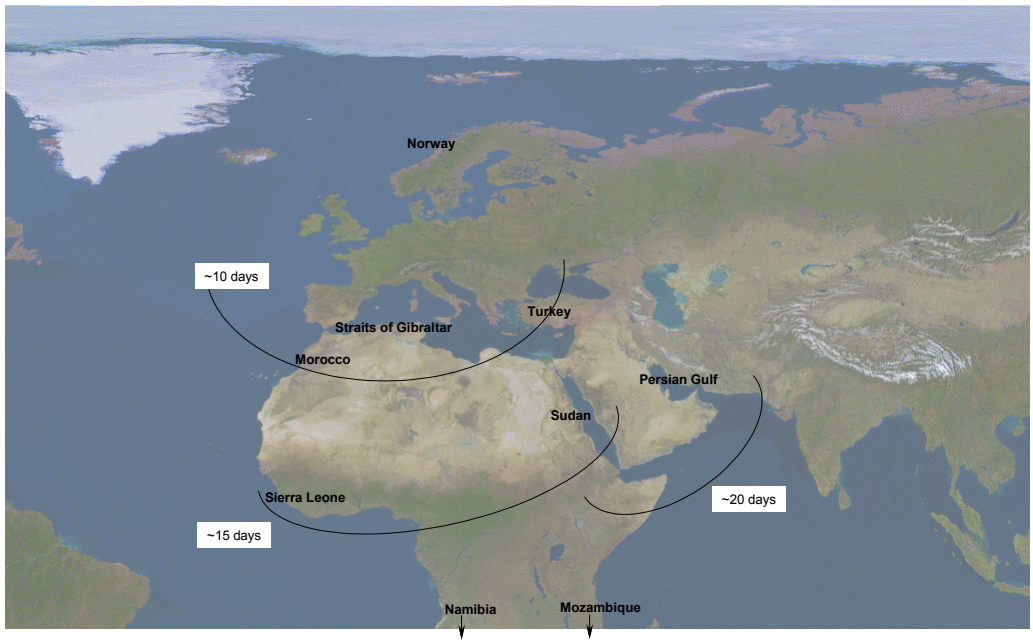
Table 3. Sea transit distances and times

Origin	Destination	Distance (nm)	Days @ 15 kt	Days @ 20 kt	Days @ 25 kt
Trondheim, Norway	Straits of Gibraltar	2,700	8	6	5
	Morocco	2,400	7	5	4
	Turkey	4,000	11	8	7
	Sierra Leone	4,400	12	9	7
	Sudan	5,400	15	11	9
	Namibia	6,600	18	14	11
	Persian Gulf	7,500	21	16	13
	Mozambique	8,200	23	17	14
Norfolk, VA	Straits of Gibraltar	3,300	9	7	6
	Morocco	3,200	9	7	5
	Turkey	4,900	14	10	8
	Sierra Leone	3,800	11	8	6
	Sudan	6,000	17	13	10
	Namibia	6,300	18	13	11
	Persian Gulf	8,400	23	18	14
	Mozambique	8,800	24	18	15
San Diego, CA	Sudan	13,000	36	27	22
	Persian Gulf	12,000	33	25	20
	Mozambique	12,000	33	25	20

The Persian Gulf and southwestern African regions can be reached in slightly over 20 days.

Inclusion of the Middle East and Persian Gulf in the time-distance relationship has potential force structure implications. The personnel for NALMEB is traditionally sourced from II MEF. However, I MEF provides Marine forces to CENTCOM. Since equipment and supplies from NALMEB can be shipped to CENTCOM within a reasonable time, manpower for future NALMEB missions may be provided by I MEF as well as II MEF.

Figure 3. NALMEB time-distance relationship



Mission framework

Appropriate missions for the future NALMEB will include the equipment prepositioned in Norway as well as the forces to employ the equipment. We do not consider as appropriate those missions in which equipment and supplies would be withdrawn to support combat losses or back-fill other programs. At times, competing priorities may necessitate such operations, but these are not the primary missions we envision for the future NALMEB program to support.

We use the traits identified previously to develop an approach to determine whether a mission is appropriate for the future NALMEB. The approach, based on METT-T (mission, enemy, terrain and weather, troops and support, and time available), provides a framework for assessing whether the location, force requirement, and operational environment are suitable. In addition, the framework provides a structure for understanding different assumptions. As assumptions are challenged and impacts assessed, the future concept for NALMEB will evolve.

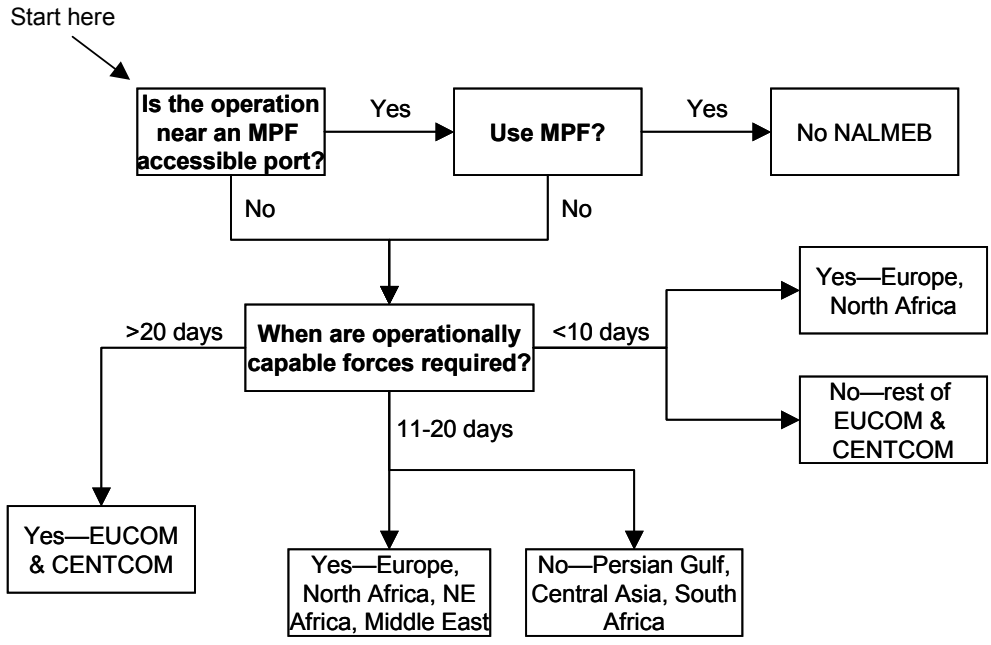
This section develops the framework and applies it to general operation categories. Applying the framework to the range of operations, we find that the following are best suited for the future NALMEB:

- Disaster relief
- Humanitarian assistance
- Aspects of peace operations
- Aspects of terrorism response operations
- Aspects of augmentation to combat forces.

Framework

The framework is a decision logic with two components. First, we consider whether the location of the mission is supportable by geoprepositioned assets in Norway (mission and terrain aspects of METT-T). The location decision diagram, shown in figure 4, begins by deciding whether the mission/operation is near a port able to support MPF operations. If so, we consider whether MPF will be used. If an MPF MEB will be used, NALMEB is probably not appropriate for the mission. If the port is not MPF accessible or if an MPF MEB will not be used, then we consider how quickly operationally capable forces will be required in the crisis area.

Figure 4. Location decision diagram



We look at three time requirements (10 days, 11-20 days, more than 20 days) for operationally capable forces (time aspect of METT-T). For NALMEB, the time requirement for operationally capable forces includes the withdrawal, loading, transit, unloading, and assembly

times. How long each step takes depends on the size of the force, location of the crisis and transit speed.

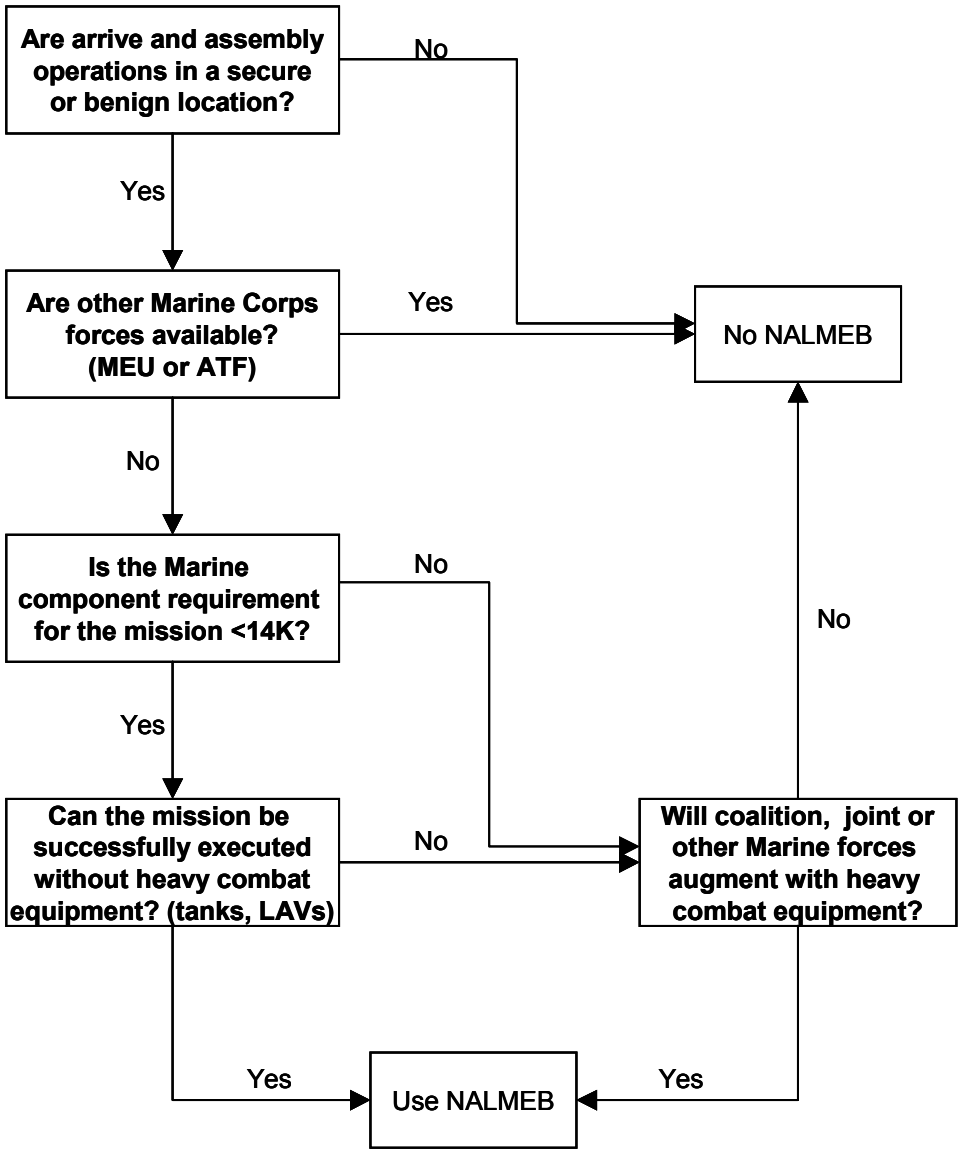
We concentrated mostly on the maritime transit times to provide an estimate of NALMEB operational capability boundaries. Data is not available for the other aspects of expeditionary NALMEB operations (withdrawal, embarkation, debarkation, and assembly), making it difficult to estimate the contribution of these operations to the total time. The future NALMEB could support much smaller MAGTF's, rely on a mixture of commercial and military shipping, and off-load in less sophisticated ports, further complicating time estimates. Also, we do not consider the additional time that would be required if forces must move significant distances from the port. Distribution of the equipment and supplies by multiple routes (air, rail, and/or sea) will also change the amount of time it takes to reach full operational capability.

When operationally capable forces are required in 10 days or less, we estimate that NALMEB's missions will be limited to operations in Europe and, depending on the force size, north Africa and Turkey. Within the 11- to 20-day window, future missions could also include those on the northwestern and northeastern African coast and in portions of the Middle East. With 20-25 days, NALMEB future missions could be expanded to most of the EUCOM (less Russia) and CENTCOM AORs as well as portions of central Asia.

Once we have determined that the mission location is supportable by NALMEB, we turn to the second decision diagram (figure 5). This framework component determines whether the force requirements and operational environment are appropriate for NALMEB missions (enemy and troops aspects of METT-T).

The construct begins by considering the operational environment for arrival and assembly operations (enemy aspect of METT-T). If the environment is either secure or benign, we then consider whether forward deployed forces are available for the mission. If forward deployed forces are not in the area or are committed to other operations, we next consider what size MAGTF is required (troops aspect of METT-T). If it will be MEB-sized or smaller, we consider the

Figure 5. Operational environment decision diagram



capabilities required for mission execution. If it will be larger than a MEB, we consider whether augmentation forces are available.

NALMEB is currently a light mechanized MEB, and we assume that heavy combat equipment (tanks, AAVs, or LAVs) will not be added to the equipment mix. If such equipment is required for mission

execution, NALMEB may still be appropriate if it can be augmented from joint, coalition, or other Marine forces.

If none of these conditions are met, the mission may not be appropriate for NALMEB. That is, if the environment is hostile, if forward deployed forces are available, if the Marine component is larger than 14,000 and augmentation forces are not available, or if heavy combat equipment is required but not available, then the mission is probably not appropriate for NALMEB.

Several assumptions are embedded in the two decision diagrams. These assumptions, summarized in table 4, offer points for further development and refinement. In some cases, changing the assumptions will have a dramatic effect on the kind of missions that NALMEB can support. For example, if the Marine Corps increases the amount of combat equipment prepositioned in Norway, NALMEB may be appropriate for combat missions without augmentation from other forces.

Table 4. Decision diagram assumptions

Diagram	Assumption
Location (figure 4)	Sea shipping is preferred.
	Commercial shipping has reduced port requirements compared to MPF.
	Operational capability distance boundaries are based on transit times.
	MPF(F) port requirements are the same as MPF's.
Operational environment (figure 5)	NALMEB will not have forcible entry capability.
	Forward deployed forces are employed first, when appropriate.
	Marine Corps will be a component of a larger force.
	NALMEB will support up to 14,000 Marines.
	NALMEB can support more than one small MAGTF simultaneously.
	NALMEB will not have organic tanks, LAVs, or AAVs.

Military operations

To determine which categories of operations are most appropriate for the future NALMEB, we applied the framework (figure 4 and 5)

to the range of military operations in figure 2.[2] To make this assessment, we assumed that the location and MAGTF size were appropriate for the NALMEB force. We did not assume any equipment or supply constraints, aside from the heavy combat equipment mentioned previously. The assessment shows that three operational categories are generally **appropriate** for the future NALMEB (green in figure 6):

- Disaster relief
- Humanitarian assistance
- Peacekeeping (a component of peace operations).

In addition, three categories are appropriate for NALMEB **under specific operational conditions** (yellow in figure 6):

- Peace enforcement (a component of peace operations)
- Terrorism response operations
- Ground combat and augmentation to other combat forces.

Finally, three categories are **not appropriate** (red in figure 6):

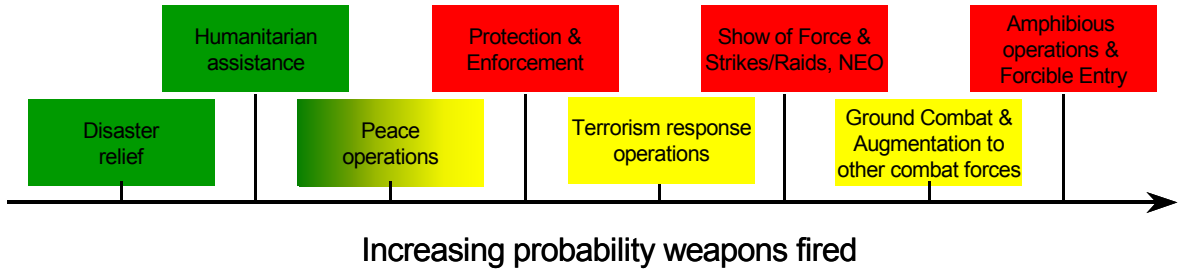
- Protection and enforcement
- Show of force, strikes, raids, and NEO
- Amphibious and forcible entry operations.

Appropriate

We determined that humanitarian assistance and disaster relief operations are generally appropriate missions for the future NALMEB by comparing the common operational characteristics to the operational environment decision diagram (figure 5). Some of the common characteristics for these two operations are that military

2. We realize that there are always exceptions and each operation presents unique challenges. Our intent is to provide a strategic level assessment of what missions seem to be the most and least appropriate for the future NALMEB.

Figure 6. Appropriateness of military operations



forces supplement host nation civil authorities, operations are limited in scope and duration, and military forces can provide a rapid response to remote locations [15]. In addition, humanitarian assistance operations can occur in conjunction with or in preparation for more intense operations.

The decision diagram in figure 5 begins with an assessment of the operational environment, which should be secure or benign for these two operational categories. Since we are assuming that the MAGTF required is an appropriate size, we next consider whether heavy combat equipment is required. From the characteristics noted above, it appears that most humanitarian assistance and disaster relief operations do not require such equipment, and are appropriate missions for the future NALMEB.

Peacekeeping, a type of peace operations, is also an appropriate mission for the future NALMEB. Some of the characteristics of peacekeeping operations are that the major parties involved in the dispute consent to monitoring, multilateral support is available, and, usually the mission is endorsed by the United Nations. The military forces are used to monitor and facilitate implementation of an agreement [15]. These characteristics suggest that the arrival and assembly operational environment will be secure. While the mission may require heavy combat equipment, these requirements could be filled by joint or coalition partners. Overall, peacekeeping is likely to be an appropriate mission for the future NALMEB.

Appropriate with conditions

Three categories of operations are appropriate missions for the future NALMEB under specific conditions: terrorism response, ground combat/augmentation, and peace enforcement (another element of peace operations). These usually have a less secure operational environment than the missions discussed in the previous section.

Terrorism response operations can range from support to civilian agencies after an attack, to offensive operations against terrorist cells. Military involvement after an attack resembles a humanitarian assistance or disaster relief operation, and is an appropriate mission for the future NALMEB. Offensive operations resemble combat operations, and may be appropriate under certain conditions.

Ground combat or augmentation to other combat forces can range from direct action/urban operations to establishing forward operating bases or expeditionary airfields in a variety of operational environments. Comparison of these traits to the decision diagram in figure 5 indicates that a benign or secure arrival and assembly environment is key to NALMEB employment. Without a secure arrival and assembly environment, these missions are probably not appropriate for NALMEB. On the other hand, establishment of a forward base in an austere location could be an appropriate mission. If the environment is secure, we next consider the equipment requirement. It is likely that some type of heavy combat equipment will be needed, and use of NALMEB will depend on the availability of other Marine, joint, or coalition forces to make up the deficiency.

Peace enforcement operations differ from peacekeeping in that the major parties involved in the dispute have not consented to intervention. This creates a less secure operational environment; under extreme conditions, these operations may not be appropriate ground mission for NALMEB. NALMEB most likely can support the air portion of such operations, but will require augmentation by heavy combat equipment for ground operations.

Not appropriate

Three operations categories are not appropriate missions for NALMEB: protection and enforcement; show of force, strikes, and raids; and amphibious and forcible entry operations. These missions generally have hostile arrival and assembly environments and/or are performed by forward deployed forces.

Protection and enforcement operations supported by the Navy-Marine Corps team include providing security for embassies, naval vessels, naval bases, and special events; enforcing exclusion zones, sanctions, and maritime intercepts; and protecting shipping, sea lines of communication, and overflights. These types of operations are usually done by forward deployed forces, and are not appropriate missions for NALMEB.

The show of force, strikes and raids category includes tactical recovery and reconnaissance operations. Non-combatant evacuation operations also loosely fit into this category. Many of these operations are time sensitive, so NALMEB future would probably be unable to respond quickly enough (figure 4). In addition, these types of operations are MEU(SOC) missions [16]. Given their typically short time lines and the likelihood that other Marine forces will be available, these types of operations fall outside the mission framework and are not appropriate for NALMEB.

Today, the amphibious MEB is the only MAGTF capable of forcible entry operations (table 2). As MPF(F), ship-to-objective maneuver, and sea basing concepts mature, the Marine Corps will begin transition toward forcible insertion. In either case, forces will be operating in a hostile environment requiring heavy combat equipment for the initial assault. This condition violates the first rule of the operational environment decision diagram (figure 5); thus, the mission is not appropriate for NALMEB.

Framework applied

The mission framework provides a conceptual approach for determining when a mission is appropriate for the future NALMEB. In this section, we apply the framework to a variety of real and hypothetical operations to further define missions that may be appropriate. We apply the framework consistently and avoid adding more assumptions (as much as possible). Our intent is to show how the future NALMEB would integrate with Marine Corps operations and procedures.

We examine two types of operations: past operations and planning scenarios. Of the 64 past operations considered, we found that NALMEB would have been an appropriate alternative for five. Not surprisingly, most of the past operations that we considered not appropriate were handled by deployed forces—in particular, the MEU(SOC).

We examined three sets of planning scenarios: Defense Planning Guidance scenarios, Dynamic Commitment vignettes, and MPF(F) analyses of alternatives scenarios. Most scenarios utilize MPF, which, in our framework, immediately defaults to not considering NALMEB. We considered if NALMEB could be an alternative to MPF for each scenario. We considered a total of 30 scenarios and found seven that had appropriate missions for NALMEB. Most of the scenarios considered not appropriate required heavy combat equipment for either combat or show of force.

Past operations

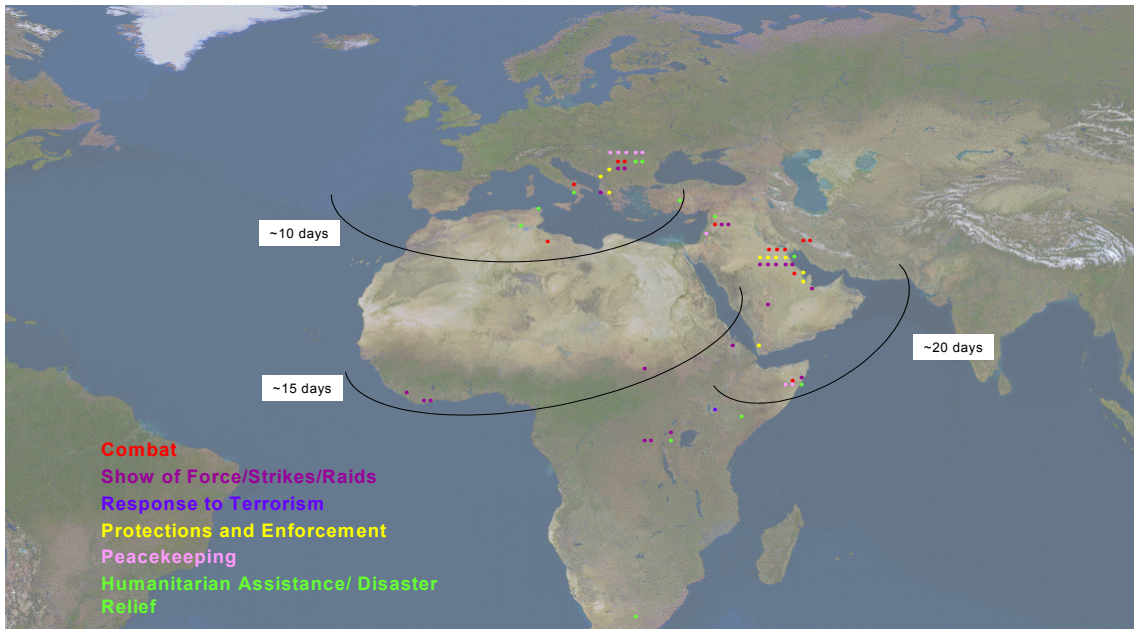
To understand the application of the NALMEB mission framework, we applied the decision rules (figures 4 and 5) to Marine Corps operations. From the operations database maintained at HQMC (PP&O), the Marines participated in about 100 operations between 1980 and 2000. We looked at 64 operations, eliminating those outside EUCOM or CENTCOM. Next, we separated the 64 operations into eight

categories (figure 2). We eliminated the shows of force, NEOs, and protection and enforcement operations. The remaining 32 operations supported the following:

- Humanitarian assistance/disaster relief(12)
- Peacekeeping (8)
- Combat (12).

Figure 7 shows the location of the 64 operations that we considered, compared to the approximate ranges in which NALMEB equipment can be moved within 10, 15, and 20 days. The colors indicate the operational category. Activity is clustered in the Persian Gulf, Balkans, and Horn of Africa.

Figure 7. Location of operations considered



Humanitarian assistance/disaster relief operations

Humanitarian Assistance/Disaster Relief account for 12 (about 20 percent) of the operations considered. Of these, three are appropriate for the future NALMEB and nine are not. Table 5 summarizes these operations. It includes the operation's name, location, AOR, and NALMEB appropriateness, stating why it is inappropriate (if applicable).

Table 5. Humanitarian assistance/disaster relief operations

Operation	Location	AOR	NALMEB appropriate?	If no, rule violated
Algerian Earthquake Relief	Algeria	EUCOM	No	Force size and duration
Lebanon Snowstorm	Lebanon	EUCOM	No	Response time and forward deployed forces (MEU)
Provide Comfort	Iraq	CENTCOM	No	Forward deployed forces (MEU)
Hot Rock	Italy	EUCOM	No	Forward deployed forces (MEU)
Provide Promise	Kosovo	EUCOM	No	Forward deployed forces (MEU)
Provide Relief	**Somalia**	**CENTCOM**	**Yes**	
Tunisia Fire	Tunisia	EUCOM	No	Forward deployed forces
Support Hope	Rwanda	EUCOM	No	Response time and forward deployed forces (MEU)
Noble Response	Kenya	CENTCOM	No	Response time
Shining Hope	**Kosovo**	**EUCOM**	**Yes**	
Avid Response	Turkey	EUCOM	No	Forward deployed forces (MEU)
Atlas Response	**South Africa**	**EUCOM**	**Yes**	

The three operations appropriate for NALMEB did not violate any of the rules in the framework. As an example, consider Operation Provide Relief, an early humanitarian operation in Somalia, beginning in August 1992. While MPF accessible ports were available, it wasn't until Operation Restore Hope (four months later) that MPF supplies were used. Somalia is located about 20 days by sea from the NALMEB storage site (figure 7). Since humanitarian crises (except for natural disasters) tend to build slowly, a 20 day response time is probably acceptable. At the time of Provide Relief, Somalia was considered a secure environment, and forward forces were not used. Finally, the

force was relatively small, consisting of a detachment from I MEF. These characteristics suggest that NALMEB could have been an alternative source to equip the I MEF detachment (instead of flying equipment and supplies from CONUS).

Two themes emerged for the nine operations that were not appropriate for the future NALMEB: forward deployed forces conducted the operation and a short response time was required. Seven of the nine operations were conducted by the forward deployed MEU(SOC). In Operation Provide Comfort, a humanitarian operation to establish refugee camps for the Kurds in northern Iraq, 24th MEU(SOC) supported the Joint Task Force Commander with ground forces.

In three of the nine operations, the required response time seemed too short for NALMEB. Consider, for example, Operation Noble Response, a disaster relief effort for flooding in Kenya in 1998. Unseasonable rains caused widespread famine in northeastern Kenya, and a Marine-led Joint Task Force supported relief efforts coordinated by the Government of Kenya and the United Nations World Food Program. The pressing need for relief combined with the distance of Kenya from Norway, suggest that NALMEB may not have been appropriate.

We consider NALMEB to be a viable alternative to forward deployed forces for humanitarian and disaster relief operations. The decision diagrams (figure 4 and 5) indicate that these types of operations are usually driven by the required response times, and all other criteria suggest that NALMEB is appropriate. If immediate relief is required, forward deployed forces (MEU(SOC)) remain the best choice. On the other hand, if reaction times are somewhat longer or if the MEU(SOC) is committed to other operations, NALMEB could deliver operationally ready forces. In particular, the future NALMEB could look at mixed distribution modes, perhaps flying in critical components of the MAGTF while shipping sustainment supplies by sea.

Peacekeeping

Peacekeeping operations account for eight of the operations considered. We considered the two operations in Somalia together and the

five in the Balkans together, so were left with a total of three peacekeeping operations for further consideration. One of these seemed appropriate and two did not. Table 6 summarizes these operations. It includes each operation's name, location, AOR, and NALMEB appropriateness, stating why it is inappropriate (if applicable).

Table 6. Peacekeeping operations

Operation	Location	AOR	NALMEB appropriate?	If no, rule violated
Palestinian Massacre	Palestine	EUCOM	No	Forward deployed forces (MEU)
Restore Hope/Continue Hope	**Somalia**	**CENTCOM**	**Yes**	
Joint Endeavor/Joint Guard/ Joint Forge/Balkan Calm/Joint Guardian	Kosovo	EUCOM	No	Forward deployed forces (MEU)

Operation Restore Hope/Continue Hope in Somalia might have been appropriate for NALMEB. While a partial MPF off-load was executed, NALMEB might have been a better choice. MPF was not configured for a partial off-load or large-scale humanitarian assistance/ peacekeeping operations. NALMEB allows for selective withdrawal tailored for the specific mission. As with Provide Relief, despite the fact that the deployment time to Somalia is more than 20 days from the NALMEB storage site, the time is adequate. Somalia was thought to be a secure environment (although there were concerns); the Marine component was about 12,800 Marines; and, while heavy combat equipment was used, other forces were available to augment the Marines.

The two operations that were not appropriate for NALMEB were conducted by forward deployed forces. Let's look at the Kosovo operations (Joint Endeavor, Joint Guard, Joint Forge, Balkan Calm, and Joint Guardian). MPF was not used in this case because Kosovo is land-locked. The distance from the NALMEB storage area is relatively short (i.e. deployment time is less than 10 days by sea or rail) and the environment was secure. However, the operations were supported by sequential MEU deployments.

As it is for humanitarian and disaster relief operations, NALMEB is a viable alternative for peacekeeping operations if forward deployed forces are not available. These types of operations seem to be driven by the operational environment and, perhaps, force size (figure 5). If the operational environment is uncertain, the MEU(SOC) may be an appropriate initial and/or enabling force. If additional forces are required, NALMEB should be considered as an alternative for MPF to reinforce the MEU(SOC).

Combat

Combat operations account for 12 of the operations considered. After combining like (or extension) operations, we had 11 operations for further consideration. Of these, one operation is appropriate for NALMEB, one may be appropriate, and nine are not appropriate. Table 7 summarizes these operations. It includes each operation's name, location, AOR, and NALMEB appropriateness, stating why it is inappropriate (if applicable).

Table 7. Combat operations

Operation	Location	AOR	NALMEB appropriate?	If no, rule violated
Desert One	Iran	CENTCOM	No	Environment
Lebanon With-drawal	Lebanon	EUCOM	No	Environment
Achille Lauro	Italy	EUCOM	No	Sea based
El Dorado Canyon	Libya	EUCOM	No	Sea based
Earnest Will	Persian Gulf	CENTCOM	No	Sea based
Praying Mantis	Iran	CENTCOM	No	Time/duration, sea based
Desert Storm	**Iraq**	**CENTCOM**	**Maybe**	
United Shield	Somalia	CENTCOM	No	Sea based, amphibious opera-tion
Deliberate Force	Kosovo	EUCOM	No	Forward deployed forces
Desert Strike/Desert Fox	Iraq	CENTCOM	No	Sea-based
Noble Anvil	**Kosovo**	**EUCOM**	**Yes**	

In two combat operations, NALMEB probably would have been appropriate. In Operation Noble Anvil, the U.S. part of NATO air strikes on Kosovo, NALMEB aviation support equipment was shipped to Hungary. NALMEB also might have been appropriate for some aspects of Operation Desert Storm. NALMEB was most likely not appropriate for the main combat operations, as illustrated by violation of three decision rules: MPF was used, the force size was greater than 14,000 and heavy combat equipment was required. On the other hand, NALMEB might have been appropriate for some supporting operations because response time was adequate and the staging environment secure. Interestingly, the USMC did request use of some NALMEB equipment in support of Desert Storm, but did not use it because of Norwegian restrictions. (Desert Storm took place before the out of area use policy was approved in 1995, and the threat from the USSR still existed.)

In the nine operations that were not appropriate, two themes emerged: operations were sea-based and the operational environments were hostile. Six of the nine operations were executed primarily from ships, and so were not appropriate for NALMEB. Two of the nine were in hostile operating environments.

Summary

Of the 32 operations considered in EUCOM and CENTCOM, five or six seemed appropriate for NALMEB. In many cases, forward deployed forces (in particular MEU(SOC)) provided an immediate response to the crisis. Given the current strategic environment, the MEU(SOC)s may have competing commitments, making a timely response to lower end operations more difficult. As discussed, NALMEB may be a viable alternative, reducing the mission load of the MEU(SOC), when appropriate.

Scenarios

To further understand the application of the NALMEB mission framework, we applied the decision rules to a variety of scenarios. We looked at scenarios from the following sources:

- Defense Planning Guidance
- Dynamic Commitment Vignettes
- Maritime Prepositioning Force Analyses of Alternatives.

Below, we give a summary of the Defense Planning Guidance and Dynamic Commitment findings. The details are presented in a separate, classified document [9].

Defense Planning Guidance scenarios

We applied the mission framework to ten Defense Planning Guidance scenarios. The scenarios were written in 2000, but are still approved by the Office of the Secretary of Defense for use with the 1:4:2:1 construct. We found that for the future NALMEB, eight of the scenarios are not appropriate, one may be appropriate under certain conditions and one is appropriate. We provide the scenario details and relevance to NALMEB in [9].

Dynamic Commitment vignettes

We applied the mission framework to 17 of the 59 Dynamic Commitment vignettes, developed by the Joint Staff J-8 in support of a series of force structure wargames. The vignettes cover the full range of military operations in locations all over the world. We focused on vignettes in the EUCOM and CENTCOM AOR. We found that six of the vignettes are appropriate missions for the future NALMEB (details are provided in [9]).

Maritime Prepositioning Force scenarios

We applied the mission framework to the unclassified scenarios developed for the MPF(F) analysis of alternatives (AoA). All of the scenarios call for the use of MPF(F), and are designed to emphasize the operational capabilities defined in the mission needs statement [10]. In particular, the scenarios call for arrival and assembly of the MPF(F) MEB at sea, which is significantly different from current practices. The scenarios are summarized in table 8.

Table 8. MPF(F) AoA scenarios

Mission type	Scenario	Future NALMEB?	Scenario
HA/DR	Bangladesh	No	U.S. forces lead disaster relief efforts after multiple cyclones hit the Bangladesh coast.
Combat	Indonesia	No	U.S. forces support and stabilize a weak democracy threatened by rebel groups.
Combat	Iran	No	U.S. leads a coalition of forces to open the Strait of Hormuz and protect commercial shipping in the Persian Gulf.

Because MPF(F) is used in each scenario, the decision diagram (figure 4) indicates that these missions are not appropriate for the future NALMEB. Instead, we consider whether NALMEB would be appropriate in the event that MPF(F) was not available. Again, we find that these missions are not appropriate for the future NALMEB (table 8).

Both the humanitarian assistance/disaster relief and small scale contingency scenarios require operational capable forces to be near the crisis area by C+6. The future NALMEB would not arrive until after 25 days—well outside the required delivery date for forces. The third scenario, a major theater war in Iran, requires operationally capable forces by C+10, and the future NALMEB could get to the area in around 20 days. But even if the time delay was acceptable, the scenario calls for forcible entry operations and intense combat—missions that are not appropriate for NALMEB.

Evaluation

We have defined the scope of selected contingency requirements for the future NALMEB. These new missions include humanitarian assistance, disaster relief, and aspects of peace operations, as well as augmentation to combat operations. In this section, we evaluate the NALMEB equipment mix compared to the new missions, cross-walking the capabilities to major equipment requirements.

Redesigning NALMEB to support more missions outside of Norway will likely impact the equipment requirements. New missions may require different capabilities, and Norwegian Army equipment may not be available for use outside of Norway. With these considerations, we approach possible equipment adjustments from three perspectives:

- Capabilities needed for lower-intensity conflicts
- Capabilities provided by HNS Battalion
- Capabilities of the 2015 MEB.

Capabilities needed for lower intensity conflicts

Lower intensity conflicts—in particular, humanitarian assistance and disaster relief—were not considered when the current prepositioning objective was established. To determine whether the current NALMEB mix meets the requirements of these types of operations, we considered the required capabilities identified in a 1995 CNA study and the equipment used in Operation Restore Hope (a large-scale humanitarian operation/peacekeeping operation in Somalia).

Required capabilities from a 1995 CNA study

In the mid-1990s, CNA conducted a study for the Marine Corps that identified and analyzed Marine support to humanitarian operations [17]. Recognizing that humanitarian assistance operations are

complex, the study team analyzed requirements in several areas. One area, logistics and engineering requirements, lists specific logistics requirements for lower intensity conflicts, with a focus on humanitarian and disaster relief operations [18].

Table 9 shows the required logistics and engineering required capabilities and indicates whether NALMEB currently has the capability [18].

Table 9. Lower intensity conflict required capabilities [18]

Functional area	Required capability	NALMEB capability?
Roads, bridges and rails	Develop new lines of communication	Yes
	Improve existing lines of communication	Yes
Mines and unexploded ordnance	Identify and mark mine-hazard areas	Yes
	Clear mines	Yes
Water	**Create/identify alternative water supply sources**	**No**
	Repair and restore existing water supply facilities	**Limited**
	Provide bulk water	Yes
Fuel	**Provide bulk fuel support**	**Limited**
Power	Restore existing power supplies	Yes
	Provide power services	**Limited**
Hygiene and sanitation	Remove and clear debris	Yes
	Restore essential public sanitation services	**No**
	Provide hygiene and sanitation services	**Limited**
Facilities construction and repair	Survey sites and plan facilities	Yes
	Acquire construction materials	Yes
	Repair existing facilities	Yes
	Improve and/or construct airfields and ports	Yes
	Construct new facilities	Yes
Food	**Construct and run field kitchens**	**Limited**
	Distribute and store food	**No**
Transportation	**Establish distribution system for relief supplies**	**Limited**
	Provide transportation services	**Limited**
Supplies	Acquire supplies	Yes
	Warehouse supplies	Yes
	Provide supply support in the AOR	Yes
Camps and support structure	Construct camps	Yes
	Run camps and life support centers	**No**

This assessment is our best judgment, based on NALMEB's organic capability as defined in the Prepositioning Objective and Force list [19, 20]. In addition, we considered the engineering tasks normally performed by an engineer support battalion [21]. An entry of "yes" means that NALMEB has the capability to meet most of this requirement. An entry of "limited" means that NALMEB has the ability to meet some of this requirement, and some equipment adjustments may be required. An entry of "no" means that a possible deficiency exists that may require equipment and/or force structure adjustments.

NALMEB should be able to meet many of the requirements with the organic engineer support battalion detachment (table 9). For example, camp construction, repair, and maintenance tasks are assigned to this organization. Today, both Naval Construction Force (Seabee) units and the Norwegian HNS Battalion support NALMEB [19, 22]. The Seabees generally support MAGTF operations, augmenting the Marine engineers and providing a more robust capability. Because the HNS Battalion (discussed below) will probably not participate in out of Norway operations, the Seabee units may be critical to future NALMEB missions. Without augmentation by the Seabees, the NALMEB engineer detachment could have trouble meeting the demands of a Somalia-like humanitarian or disaster operation.

NALMEB could provide limited support for seven of the required capabilities in table 9. Three of the seven—bulk fuel support, distribution system for relief supplies and transportation services—are the types of support provided by the HNS Battalion today. This suggests that there may be equipment deficiencies related to the fuel handling and transportation assets organic to NALMEB. NALMEB probably has enough organic capability to handle the remaining four requirements at the tactical level, essentially supporting the MEB only. The MEB assets would likely be overwhelmed by a large humanitarian or disaster operation. Small SPMAGTFs sourced through NALMEB would likely be able to support these capabilities.

NALMEB would most likely be unable to support four of the required capabilities—create alternative water supply sources, restore essential public sanitation services, distribute and store food, and run camps.

These capabilities are seldom required for traditional missions, and NALMEB is not designed for them.

Equipment used in Operation Restore Hope

Operation Restore Hope may be described best as a security operation in the context of humanitarian assistance. Its purpose was to establish a secure environment in which humanitarian relief organizations could provide famine relief services. CNA supported the operation by collecting data on crisis planning, command and control, rules of engagement, interactions with humanitarian relief organizations, and logistics [6]. The logistics data includes equipment lists at the item level extracted from the daily logistics status reports [23]. To identify the strengths and weaknesses of the NALMEB equipment mix, we estimated the equipment requirements using the Restore Hope data, as described in [23].

Essentially, we scaled the quantities of equipment used in Operation Restore Hope equipment quantities to a NALMEB sized force. We considered equipment at D+53, the day with the most equipment and forces in Somalia. We limited our consideration to Marine Corps readiness reportable equipment, construction materials (class IV), and medical supplies (class VIII) [24]. The equipment supported a 34,000 man force, which included both Army and Marine Corps units. To scale the Operation Restore Hope data, we multiplied the amount of equipment by 35 percent for a 12,000 Marine NALMEB (current size) or by 42 percent for a 14,400 Marine NALMEB (2015 MEB size). We compared the 12,000 Marine NALMEB equipment amounts to the NALMEB requirement. The NALMEB requirement includes both the prepositioning objective and the fly-in echelon [19]. Results are summarized in tables 10-14, with shortfalls shown for a 12,000 sized NALMEB in bold. Percentage shortfalls are calculated for the 12,000 sized NALMEB only.

The readiness reportable engineering equipment used in Somalia is shown in table 10, and major construction materials are shown in table 11. Overall, the NALMEB engineering equipment meets many of the calculated requirements. Engineering equipment shortfalls include generators, road graders, and tractors. In addition, two

Table 10. Engineering equipment evaluation

TAMCN	Name	Somalia	14,400 sized MEB	12,000 sized MEB	NALMEB PO	NALMEB FIE	Shortfall?
B0011	Air conditioner	1	1	1	21	0	No
B0391	Container handler	28	12	10	0	15	No
B0443	Crane, high speed	3	1	1	5	3	No
B0446	Crane, rough terrain	3	1	1	18	0	No
B0685	Amphib. fuel system	12	5	4	8	0	No
B0730	3 KW generator	107	45	37	90	45	No
B0891	10 KW generator	106	45	37	38	100	No
B0953	30 KW generator	20	8	7	67	19	No
B0921	Quiet generator	16	7	6	2	12	No
B0971	**Generator**	**17**	**7**	**6**	**0**	**0**	**Yes, 100%**
B1016	**Generator**	**47**	**20**	**16**	**6**	**0**	**Yes, 60%**
B1021	Generator	40	17	14	45	43	No
B1045	Generator	37	16	13	20	10	No
B1082	**Road grader**	**37**	**16**	**13**	**8**	**4**	**Yes, 8%**
B1580	Fuel pump module	18	8	6	17	14	No
B1922	Scraper-tractor	8	3	3	0	4	No
B2085	Fuel storage tank	73	31	26	44	122	No
B2460	Tractor with blade	12	5	4	9	3	No
B2462	Caterpillar tractor	38	16	13	5	17	No
B2482	**Tractor, all wheel**	**32**	**14**	**11**	**8**	**1**	**Yes, 20%**
B2561	Forklift	22	9	8	47	5	No
B2566	Forklift, rough	91	38	32	37	0	No
B2567	Tractor	82	35	29	37	8	No
B2604	ROWPU	40	17	14	14	22	No

Table 11. Construction materials evaluation

Name	Somalia	14,400 sized MEB	12,000 sized MEB	NALMEB PO	Shortfall?
Sheets of plywood	**50,722**	**21,500**	**17,900**	**1000**	**Yes, 95%**
Board feet lumber	**965,770**	**409,000**	**341,000**	**50,000**	**Yes, 85%**
Pounds of nails	**64,100**	**27,000**	**22,700**	**4000**	**Yes, 80%**
Bags of cement	**86,700**	**36,700**	**30,600**	**0**	**Yes, 100%**
Rolls of concertina	**2300**	**975**	**811**	**635**	**Yes, 20%**
Roofing sheets	**500**	**212**	**176**	**0**	**Yes, 100%**

critical engineering equipment requirements can only be achieved by incorporating the fly-in echelon. The container handler (B0391) is supported exclusively by the fly-in echelon, and 60 percent of the caterpillar tractors are based in CONUS. The construction material shortfalls, shown in table 11, are extensive in all areas considered, including lumber, nails, and cement.

The readiness reportable motor transport equipment used in Somalia is shown in table 12. Of the 19 items considered, five had shortfalls. The major shortfalls were in tractors (D1134) and trailers (D0235). In addition, the equipment requirements for several items can only be achieved with the fly-in echelon. These items include 5-ton trucks (D1059), a HMMWV variant (D1180), two LVS trailers (D0879 and D0877), and bulk fuel trailers.

Table 12. Motor transport evaluation

TAMCN	Name	Somalia	14,400 sized MEB	12,000 sized MEB	NALMEB PO	NALMEB FIE	Shortfall?
D0209	MK 48, LVS	90	38	31	58	0	No
D0215	Bulk fuel trailer	70	30	24	20	13	No
D0235	**40-ton trailer**	**349**	**148**	**122**	**12**	**13**	**Yes, 80%**
D0876	Container trailer	53	22	19	35	1	No
D0877	Wrecker trailer	9	4	3	2	5	No
D0878	Power trailer	11	5	3	12	13	No
D0879	Crane trailer	16	7	6	0	16	No
D0880	Water trailer	153	65	54	87	12	No
D1001	**Ambulance**	**83**	**35**	**29**	**0**	**25**	**Yes, 15%**
D1002	Ambulance	24	10	8	6	9	No
D1059	5-ton truck	706	299	247	147	145	No
D1061	Cargo truck	10	4	3	53	6	No
D1072	**Dump truck**	**122**	**52**	**43**	**30**	**12**	**Yes, 2%**
D1134	**Tractor**	**319**	**135**	**112**	**22**	**13**	**Yes, 70%**
D1125	HMMWV	6	2	2	24	0	No
D1158	HMMWV	1076	456	377	463	25	No
D1159	HMMWV	1	1	1	48	46	No
D1180	HMMWV	9	4	3	0	27	No
D1212	**Wrecker**	**68**	**29**	**24**	**22**	**0**	**Yes, 8%**

The reliance on the fly-in echelon for some key engineering and motor transportation assets requires further consideration. In particular, we need to consider the trade-off between having the equipment pre-positioned in Norway, with potential low usage, and the cost to strategically lift the assets if required for expeditionary operations.

The readiness reportable combat equipment used in Somalia is shown in table 13. NALMEB is a light infantry MEB and does not contain heavy combat equipment. Table 13 shows that AAVs, LAVs and tanks, in addition to the howitzers, were used in Somalia.

Table 13. Combat equipment evaluation

TAMCN	Name	Somalia	14,400 sized MEB	12,000 sized MEB	NALMEB PO	NALMEB FIE	Shortfall?
E0665	Howitzer	15	6	5	18	0	No
E0796	**AAV C2**	**1**	**1**	**1**	**0**	**0**	**Yes, 100%**
E0846	**AAV**	**30**	**13**	**10**	**0**	**0**	**Yes, 100%**
E0947	**LAV-25**	**13**	**5**	**5**	**0**	**0**	**Yes, 100%**
E0948	**LAV-L**	**1**	**1**	**1**	**0**	**0**	**Yes, 100%**
E1888	**M1A1 tank**	**7**	**3**	**2**	**0**	**0**	**Yes, 100%**

The medical and dental AMALs used in Somalia are shown in table 14. For the high density AMALs, NALMEB can meet the requirement for laboratory consumables (AMAL 619). There are significant shortages in triage (AMAL 632) and ward consumables (AMAL 634). We noted modest shortfalls in basic consumables (AMAL 636) and operating room consumables (AMAL 640). The potential shortcomings in the NALMEB medical supplies likely reflect the original expected usage of the equipment. NALMEB was established for land combat, not for assisting large civilian populations.

Capabilities provided by HNS Battalion

For the defense of Norway, 2d MEB arrives in the Trondheim area to assemble with the prepositioned equipment before moving to the key employment area. The Norwegian Army provides the HNS Battalion—a unique Norwegian mobilization unit with about 850 soldiers

Table 14. Medical/dental supplies evaluation

TAMCN	Name	Somalia	14,400 sized MEB	12,000 sized MEB	NALMEB PO	Shortfall?
C8604	AMAL 619	39	16	14	16	No
C8608	**AMAL 621**	**1**	**1**	**1**	**0**	**Yes, 100%**
C8610	**AMAL 624**	**7**	**3**	**2**	**0**	**Yes, 100%**
C8614	AMAL 627	2	1	1	5	No
C8618	AMAL 629	2	1	1	6	No
C8620	AMAL 630	1	1	1	14	No
C8628	**AMAL 632**	**93**	**39**	**33**	**12**	**Yes, 60%**
C8630	AMAL 633	10	4	3	5	No
C8634	**AMAL 634**	**116**	**49**	**41**	**19**	**Yes, 55%**
C8638	AMAL 635	17	7	6	16	No
C8640	**AMAL 636**	**94**	**40**	**33**	**26**	**Yes, 20%**
C8654	**AMAL 640**	**78**	**33**	**27**	**25**	**Yes, 10%**
C8658	AMAL 649	3	1	1	16	No
C8715	AMAL 662	2	1	1	8	No
C8725	**AMAL 664**	**1**	**1**	**1**	**0**	**Yes, 100%**
C8684	AMAL 684	2	1	1	1	No
C8740	**AMAL 699**	**2**	**1**	**1**	**0**	**Yes, 100%**

and equipment—to assist 2d MEB with transportation and other combat service support activities. The HNS Battalion would probably not participate in NALMEB operations outside of Norway, creating potential shortfalls in combat service support equipment.

Table 15 shows the equipment contributions of the HNS Battalion for selected transportation, engineering, and medical vehicles [19]. In addition, we show the U.S. equipment that provides a similar capability as the HNS. We did not include the over-snow vehicles, an exclusive Norwegian contribution. The final column shows the percentage of the total capability (HNS + U.S) available for deployment outside of Norway. We highlight several potential equipment shortfalls for large NALMEB operations outside of Norway in bold. The major deficiency is in heavy engineering equipment, suggesting the incorporation of Seabee units may be critical, especially for humanitarian and disaster relief operations.

NALMEB may require a different fuel strategy for any operation outside of Norway. For the defense of Norway, Norway contributes some common user items such as petroleum, oils and lubricants [25]. In addition, bulk fuel requirements are filled by a NATO fuel prepositioning program in Norway. These capabilities and assets will not be available for out of Norway operations.

Table 15. HNS Battalion capabilities

Support area	HNS capability	Equipment	Qty HNS (Norway)	Qty MEB equivalent (U.S.)	U.S. capability w/o HNS
Medical	**Evacuate 246 stretcher or 420 walking patients in one lift**	**Ambulance**	**36**	**40**	**50%**
Transportation	Transport ~1,080 tons or ~3,600 Marines on road in one lift Transport ~114 tons or 1,126 Marines cross country in one lift	5-ton truck	180	351	65%
	Perform 3d echelon recovery ops	Wrecker	5	22	80%
Engineering	**Perform various heavy engineering support functions**	**Dump truck**	**15**	**0**	**None**
		Excavator	**3**	**0**	**None**
		Dump truck trailer	**6**	**0**	**None**
		Drill rig	**1**	**0**	**None**
		Back hoe	**6**	**4**	**40%**
		Front loader	6	45	90%
		Bulldozer	3	53	95%
		Road grader	1	12	90%

2015 MEB capabilities

The 2015 MEB, developed by MCCDC, is a baseline MAGTF for expeditionary maneuver warfare concept development [11, 26]. The MEB was developed to have several desired capabilities, not to met a specific threat. The capabilities of the 2015 MEB include: forcible entry; over the horizon operations; power projection without ports or airfields; multiple concurrent, dissimilar missions; and continuous sustainment. The major items assigned to meet these capabilities, including the current NALMEB equivalents, are shown in table 16.

Table 16. 2015 MEB

Category	2015 MEB Equipment	Qty 14,400 2015 MEB	Qty 12,000 2015 MEB	NALMEB Equivalent	Qty NALMEB
Ground	**AAAV**	106	88	None	0
	LAV	60	50	None	0
	Tank	29	24	None	0
	LW155	18	15	Howitzer	18
	EFSS	8	7	New Capability	
	HIMARS	6	5	New Capability	
	HMMWV	990	825	HMMWV	530
	ITV	21	17	None	0
	MTVR	430	358	5-ton Truck	248
	LVS	105	87	LVS	58
Aircraft	UH-1Y	9	7	UH-1N	9
	AH-1Z	18	15	AH-1W	18
	CH-53E	20	17	CH-53E	16
	MV-22	48	40	CH-46E	36
	JSF	36	30	AV-8B & F/A-18 A/B/C	68
	EA-6B	5	4	EA-6B	5
	KC-130	12	10	KC-130	6

Our mission framework assumes that the future NALMEB will not have heavy combat equipment, but rather will keep about the same level of combat power as today. Table 16 shows the quantity of equipment required if this assumption is challenged. For a 12,000 Marine MEB with the same capabilities as the 2015 MEB, an additional 154 combat end items (AAAV, LAV, and tanks), excluding the supporting equipment and supplies, are required (about 83 percent of the 2015 MEB requirement).

The 2015 MEB includes three systems for improved fires: the LW155, the expeditionary fires support system (EFSS) and the high mobility artillery rocket system (HIMARS). The EFSS and HIMARS are new capabilities for the Marine Corps and are still in the early stages of the acquisition process. The LW155 is the replacement for the howitzer. As outlined in a recent MROC meeting, none of these improved fires systems will be available to the future NALMEB. Specifically, the MROC approved the recommendation of the AAO IPT (Approved

Acquisition Objective Integrated Product Team) concerning NALMEB equipment replacement policy. The new policy indicates that existing capabilities will be modernized, but that systems providing new capabilities (such as the LW155, EFSS, and HIMARS) will not be added [27]. As the Marine Corps considers expanding NALMEB for future missions, the MROC decision will need to be revisited.

The 2015 MEB has several upgraded airframes as well as the Joint Strike Fighter (JSF) and MV-22. NALMEB has the aviation support equipment prepositioned in Norway, but not the airframes. Today, if needed for the defense of Norway, the platforms would be flown in by 2d MAW, II MEF. As we consider the future, more expeditionary, NALMEB, the aviation component of the MAGTF will be vital. This suggests that integration of the upgraded airframes in the NALMEB prepositioning and planning process is important. While prepositioning airframes is likely not feasible, a capability to move the air component to the crisis area should be considered. In addition, new airframes may require changes or additions to the prepositioned aviation support equipment.

Future missions and next steps

At the beginning of the paper, we set out to determine what mission(s) the Marine Corps should use to tailor the future NALMEB program. After exploring options for future program traits and developing a mission framework, we recommend designing the future NALMEB program to support mid- and low-intensity military operations. These types of operations include disaster relief, humanitarian assistance, and aspects of peace, terrorism response, and augmentation operations.

As NALMEB becomes more expeditionary and supports mid-/low-intensity operations, some adjustments to the equipment mix will be required. In particular, deployments out of Norway will not have the support currently provided by the Norwegian HNS Battalion; thus, NALMEB may need to increase the engineering and transportation equipment organic to the combat service support element. Humanitarian and disaster relief operations are logistics intensive, suggesting that further combat service support additions may be needed.

We will estimate the cost of these equipment mix changes in the next report. Specifically, we will develop cost estimates, including acquisition/modernization and transportation costs, for the following courses of action:

- The current modernization plan
- An enhanced humanitarian/disaster relief capability
- An enhanced engineering and transportation capability
- An enhanced combat capability.

In addition, we will consider how to mitigate some of these costs by augmenting the future NALMEB with U.S., Norwegian, or other NATO forces.

Finally, we will synthesize the study findings and develop an implementation plan to achieve the future NALMEB. The plan will outline the necessary sequence of events and consider high level implementation issues such as command relationships, processes and procedures, and management structure.

Glossary

AAAV	Advanced amphibious assault vehicle
AAV	Amphibious assault vehicle
ACM	Air contingency MAGTF
AoA	Analysis of alternatives
AOR	Area of responsibility
CENTCOM	Central Command
CNA	Center for Naval Analyses
CONUS	Continental United States
DC	Deputy Commandant
DPG	Defense Planning Guidance
EFSS	Expeditionary fires support system
EUCOM	European Command
HA/DR	Humanitarian assistance/disaster relief
HIMARS	High mobility artillery rocket system
HMMWV	High mobility multi wheel vehicle
HNS	Host Nation Support
HQMC	Headquarters Marine Corps
ITV	Internally transported vehicle
JSF	Joint strike fighter
kt	knot (nautical miles/hour)
LAV	Light armored vehicle
LVS	Logistics vehicle system
MAGTF	Marine Air Ground Task Force
MEB	Marine Expeditionary Brigade
MEF	Marine Expeditionary Force
METT-T	Mission, enemy, terrain and weather, troops and support—time available
MEU(SOC)	Marine Expeditionary Unit (Special Operations Capable)
MFE	Marine Forces Europe
MOU	Memorandum of understanding
MPF	Maritime Prepositioning Force

MPF(F)	Maritime Prepositioning Force Future
MROC	Marine requirements oversight council
MTVR	
NALMEB	Norway Air-Landed Marine Expeditionary Brigade
NATO	North Atlantic Treaty Organization
NEO	Non-combatant evacuation operation
nm	nautical mile
ODC	Office of Defense Cooperation
OSD	Office of the Secretary of Defense
PP&O	Plans, Policy and Operations
QDR	Quadrennial Defense Review
SPMAGTF	Special purpose MAGTF
U.S.	United States
w/o	without

References

[1] Kim Deal et al. *What are the NALMEB Missions?* (U) Secret, Sep 2002 (CNA Annotated Brief D0006993.A1/Final)

[2] Office of the Secretary of Defense, *Memorandum of Understanding Governing Prestockage and Reinforcement of Norway*, Jan 1981

[3] Office of the Secretary of Defense, *Quadrennial Defense Review Report*, Sep 2001

[4] Office of the Secretary of Defense, *Defense Planning Guidance*, Month 2001

[5] Stephen Guerra et al. *Political Feasibility of Changing the NALMEB Program* (U), Secret, Feb 2003 (CNA Research Memorandum D0007804.A1)

[6] David Zvijac and Katherine McGrady. *Operation Restore Hope: Summary Report*, Unclassified, Mar 1994 (CNA Research Memorandum 93-152)

[7] Adam Siegel et al. *The MEU(SOC)s and the Kosovo Campaign: A Precedent for the Future?* Unclassified, Oct 1999 (CNA Research Memorandum 99-131)

[8] Thomas Bowditch et al. *Marine Corps Operations in Afghanistan: Key Themes and Implications for Transformation*, Unclassified, Nov 2002 (CNA Research Memorandum D0007253.A1/Final)

[9] Kim Deal et al. *Deriving Missions for the Future NALMEB Program: Appendix* (U) Secret, Feb 2003 (CNA Research Memorandum D0007802.A1)

[10] Marine Corps, Mission Needs Statement, *Maritime Prepositioning Force for the 21st Century (MPF Future (MPF(F))*, May 2001

[11] Department of the Navy, Headquarters Marine Corps, *MROC Decision Memorandum 35-2002* Jun 2002

[12] Defense Intelligence Management Document. *Port Methodolgy*. DIAM 57-2, May 1996

[13] American Embassy, Oslo, Naval Message 081557Z Aug 97. *Norwegians applaud Baltic Challenge*

[14] Informal correspondence from Joint Regional Headquarters South Norway to CNA, *Out Of Norway Travel Times*, Dec 2002

[15] Joint Chiefs of Staff, Joint Pub 3-07, *Joint Doctrine for Military Operations Other Than War*, Jun 1995

[16] Department of the Navy, Headquarters Marine Corps, MCO 3120.9B, *Policy for Marine Expeditionary Unit (Special Operations Capable) (MEU(SOC))*, Sep 2001

[17] Sandra L. Newett et al. *U.S. Marine Corps and Humanitarian Assistance Operations: Summary Report,* Unclassified, Aug 1995 (CNA Research Memorandum 95-155)

[18] Mark Geis. *Logistics and Engineering Requirements for Humanitarian Assistance Operations,* Unclassified, Apr 1996 (CNA Research Memorandum 95-152.10)

[19] Department of the Navy, NAVMC 2926, *Norway Airlanded Marine Expeditionary Brigade Prepositioning Objective*, Sep 1999

[20] Department of the Navy, Headquarters Marine Corps, MCBul 3502, *Norway Airlanded Marine Expeditionary Brigade (NALMEB) Force List (F/L)*, May 2001

[21] Department of the Navy, Marine Corps, MCWP 4-11, *Tactical-Level Logistics*, Jun 2000

[22] Department of the Navy, Marine Corps, MCWP 4-11.5, *Seabee Operations in the MAGTF*, Nov 1997

[23] John Nance and John Keenan. *MPF Support for MOOTW Study*, Unclassified, Mar 1997 (CNA Research Memorandum 97-38)

[24] Department of the Navy, Headquarters Marine Corps. MCBul 3000, *Table of Marine Corps Ground Equipment Resource Reporting (MCGERR) Equipment*, Dec 2003

[25] Department of the Navy, Headquarters Marine Corps, TM 4790-14/1E, *Logistics Support for the Norway Airlanded Marine Expeditionary Brigade (NALMEB) Geoprepositioning System*, Feb 1996

[26] Pat O'Bryan. *Baseline 2015 MEB: Brief to MPF(F) OSD EXCOM.* Marine Corps Combat Development Command, Futures Warfighting Division, Jan 2003

[27] Department of the Navy, Headquarters Marine Corps, *MROC Decision Memorandum 40-2002* Sep 2002

List of figures

List of tables