Navy LPD-17 Amphibious Ship Procurement: Background, Issues, and Options for Congress

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Summary

On April 6, 2009, Secretary of Defense Robert Gates announced a number of decisions regarding the Department of Defense's (DOD's) proposed FY2010 defense budget. Among these was a decision to defer the procurement of an 11th San Antonio (LPD-17) class amphibious ship (and of another sealift-type ship called the Mobile Landing Platform, or MLP) from FY2010 to FY2011 "in order to assess costs and analyze the amount of these capabilities the nation needs."

The Navy's proposed FY2010 budget requested $872.4 million in procurement funding to complete the cost of the 10th LPD-17, which was authorized but only partially funded in FY2009. The FY2010 budget estimates the procurement cost of this ship at $1,852.5 million. The ship has received $980.1 million in prior-year funding, most of which was provided in FY2009. The proposed FY2010 budget also requested $184.6 million in advance procurement (AP) funding for an 11th LPD-17 class ship to be procured in FY2011.

Although the Navy's planned 313-ship fleet calls for a 31-ship amphibious force that includes 10 LPD-17s, Navy and Marine Corps officials agree that a 33-ship amphibious force that includes 11 LPD-17s would be needed to minimally meet the Marine Corps' goal of having an amphibious ship force with enough combined capacity to lift the assault echelons (AEs) of two Marine Expeditionary Brigades (MEBs). A 33-ship force would include 15 amphibious ships for each MEB, and three additional ships to account for 10% to 15% of the amphibious ship force being in overhaul at any given time.

Marine Corps and Navy officials agree that a 38-ship amphibious force would more fully meet the Marine Corps' 2.0 MEB AE amphibious lift requirement. Such a force would include 17 amphibious ships for each MEB, and four additional ships to account for 10% to 15% of the amphibious ship force being in overhaul at any given time. Although a 38-ship force would more fully meet the Marine Corps' lift requirement, it appears that the Navy and Marine Corps have agreed to accept the operational risks associated with having a 33-ship force rather than a 38-ship force.

The explanatory statement for the final version of the FY2010 DOD appropriations act (H.R. 3326/P.L. 111-118 of December 19, 2009) approves the Navy's FY2010 request for procurement and advance procurement funding for the LPD-17 program.

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The primary issue for Congress addressed in this report is whether to approve, reject, or modify the Navy's request for FY2010 procurement and AP funding for the LPD-17 program. An additional, related issue addressed in this report is whether the current 2.0 MEB AE amphibious lift goal is appropriate. Congress's decisions on these issues will affect, among other things, Navy and Marine Corps funding requirements and capabilities, and the shipbuilding industrial base.

[1] Source: Opening remarks of Secretary Gates at an April 6, 2009, new conference on decisions relating to the proposed FY2010 defense budget.

Background

Amphibious Ships in General

Functions and Uses of Amphibious Ships

The primary function of Navy amphibious ships is to lift (i.e., transport) U.S. Marines and their equipment and supplies to distant operating areas, and enable Marines to conduct expeditionary operations ashore in those areas. Amphibious ships have berthing spaces for Marines, flight decks and hangar decks for their helicopters and vertical take-off and landing (VTOL) fixed-wing aircraft, well decks for storing and launching their landing craft,[2] and storage space for their wheeled vehicles, their other combat equipment, and their supplies. Although amphibious ships are designed to support Marine landings against opposing military forces, they can also be used for Marine landings in so-called permissive or benign situations where there are no opposing forces.

The large storage spaces on amphibious ships, and the ability of amphibious ships to use helicopters and landing craft to transfer people, equipment, and supplies from ship to shore without need for port facilities, make amphibious ships potentially useful for a range of non-combat and combat operations. Amphibious ships and their embarked Marine forces can be used for launching and conducting

- humanitarian-assistance and disaster-relief (HA/DR) operations;
- peacetime engagement and partnership-building activities, such as exercises;
- other nation-building operations, such as reconstruction operations;
- operations to train, advise, and assist foreign military forces;
- peace-enforcement operations;
- non-combatant evacuation operations (NEOs);
- maritime-security operations, such as anti-piracy operations;
- smaller-scale strike and counter-terrorism operations; and
- larger-scale ground combat operations.

Amphibious ships and their embarked Marine forces can also be used for maintaining forward-deployed naval presence for purposes of deterrence, reassurance, and maintaining regional stability.

Although the Marines have not conducted a large-scale amphibious assault against opposing military forces since the Korean War, Marine Corps officials state that there have been about 85 U.S. amphibious operations of other kinds between 1990 and April 2008.[3] In addition, a

[2] A well deck is a large, garage-like space in the stern of the ship. It can be flooded with water so that landing craft can leave or return to the ship. Access to the well deck is protected by a large stern gate that is somewhat like a garage door.

[3] Source for the figure of about 85 amphibious operations between 1990 and April 2008: Marine Corps briefing to CRS
(continued...)

possibility of an amphibious landing can generate tactical benefits, even if the landing is not carried out. During the 1991 Persian Gulf War, for example, the possibility of an amphibious landing by a force of about 17,000 Marines embarked on amphibious ships in the Persian Gulf tied down several Iraqi divisions in coastal-defense positions. Those Iraqi divisions positions were not available for use against U.S.-coalition ground forces moving north from Saudi Arabia.[4]

Types of Amphibious Ships

U.S. Navy amphibious ships have designations starting with the letter L, as in amphibious *l*anding. Navy amphibious ships can be divided into two main groups—the so-called "big-deck" amphibious assault ships, designated LHA and LHD, which look like medium-sized aircraft carriers, and the smaller (but still sizeable) amphibious ships designated LSD or LPD,[5] which are sometimes called "small-deck" amphibious ships. The LHAs and LHDs have large flight decks and hangar decks for embarking and operating numerous helicopters and VTOL fixed-wing aircraft, while the LSDs and LPDs have much smaller flight decks and hangar decks for embarking and operating smaller numbers of helicopters. The LHAs and LHDs, as bigger ships, in general can individually embark more Marines and equipment than the LSDs and LPDs.

Forward Deployments

On any given day, some of the Navy's amphibious ships, like some of the Navy's other ships, are forward-deployed to various overseas operating areas. Forward-deployed U.S. Navy amphibious ships are often organized into formations called expeditionary strike groups (ESGs). An ESG notionally includes three amphibious ships—one LHA or LHD, one LSD, and one LPD. These three amphibious ships, which are referred to as an amphibious ready group (ARG), together can embark a Marine expeditionary unit (MEU) consisting of about 2,200 Marines, their aircraft, their landing craft, their combat equipment, and about 15 days worth of supplies. In addition to the ARG and its embarked MEU, each ESG also notionally includes three surface combatants (some or all armed with Tomahawk cruise missiles), one attack submarine, and perhaps one or more P-3 long-range, land-based maritime patrol aircraft. ESGs are designed to be independently deployable, strike-capable naval formations, but they can also operate in conjunction with carrier strike groups (CSGs) to form larger naval task forces. On average, two or perhaps three ESGs might be forward-deployed at any given time.

Amphibious ships are also sometimes forward-deployed on an individual basis to certain lower-threat operating areas, particularly for conducting peacetime engagement activities with foreign countries or for responding to smaller-scale contingencies. In such deployments, an amphibious ship might serve as the core of a new kind of Navy formation called a Global Fleet Station (GFS). The Navy announced the GFS concept in 2006 and is now implementing it in certain areas around the world, including the Caribbean and the Gulf of Guinea, off the western coast of Africa. A core

(...continued)

on April 25, 2008.

[4] See CRS Report 91-421, *Persian Gulf War: Defense Policy Implications for Congress*, coordinated by Ronald O'Rourke, p. 41. (May 15, 1991; out of print and available directly from the report coordinator.)

[5] LHA can be translated as landing ship, helicopter-capable, assault. LHD can be translated as landing ship, helicopter-capable, well deck. LSD can be translated as landing ship, well deck. LPD can be translated as landing ship, helicopter platform, well deck. Whether noted in the designation or not, all these ships have well decks.

of a GFS consists of an amphibious ship or a high-speed sealift ship that is forward-deployed to a region of interest. Smaller Navy ships, such as Littoral Combat Ships (LCSs), might then operate in conjunction with this core ship. The Navy states that the GFS

> is a persistent sea base of operations from which to coordinate and employ adaptive force packages within a regional area of interest. Focusing primarily on Phase 0 (shaping) operations, Theater Security Cooperation, Global Maritime Awareness, and tasks associated specifically with the War on Terror, GFS offers a means to increase regional maritime security through the cooperative efforts of joint, inter-agency, and multinational partners, as well as Non-Governmental Organizations.[6]

Current Inventory of Amphibious Ships

As of the end of FY2008, the Navy included the following 32 amphibious ships:

- **7 Wasp (LHD-1) class ships**, commissioned between 1989 and 2001, each displacing about 40,500 tons;[7]
- **3 Tarawa (LHA-1) class ships**, commissioned between 1976 and 1980, each displacing about 40,000 tons;
- **12 Whidbey Island/Harpers Ferry (LSD-41/49) class ships**, commissioned between 1985 and 1998, each displacing about 16,000 tons;
- **4 San Antonio (LPD-17) class ships**, the first commissioned in 2006, each displacing about 26,000 tons;[8] and
- **6 Austin (LPD-4) class ships**, commissioned between 1967 and 1971, each displacing about 17,000 tons.

[6] U.S. Department of the Navy, *Naval Operations Concept 2006*, Washington, 2006, pp. 30. The Navy states further on pages 30-31 that:

> Like all sea bases, the composition of a GFS depends on Combatant Commander requirements, the operating environment, and the mission. From its sea base, each GFS would serve as a self-contained headquarters for regional operations with the capacity to repair and service all ships, small craft, and aircraft assigned. Additionally, the GFS might provide classroom space, limited medical facilities, an information fusion center, and some combat service support capability. The GFS concept provides a leveraged, high-yield sea based option that achieves a persistent presence in support of national objectives. Additionally, it complements more traditional CSG/ESG training and deployment cycles.

[7] For comparison, a Nimitz-class nuclear-powered aircraft carrier displaces about 100,000 tons, and a cruiser or destroyer displaces about 9,000 tons.

[8] Of the nine LPD-17s procured through FY2008, three were in service and six were under construction as of the end of FY2008.

Amphibious Lift Goal[9]

Expressed in Terms of MEBs

The Marine Corps' goal for amphibious lift is to have a force of amphibious ships with enough combined lift capacity to simultaneously land the assault echelons (AEs) of two Marine Expeditionary Brigades (MEBs), or 2.0 MEB AEs for short. This goal, Marine Corps officials state, reflects responsibilities assigned to Marine Corps forces in U.S. regional war plans.

A MEB is a Marine air-ground task force (MAGTF) of 14,484 Marines and their equipment and supplies. The AE of a MEB is the initial part of the MEB to go ashore. The remaining part that goes ashore later is called the assault follow-on echelon (AFOE). Marine Corps doctrine calls for the AE to go ashore from amphibious ships, and for the AFOE to go ashore from less-survivable sealift (i.e., cargo-type) ships controlled by the Military Sealift Command (MSC). The AE of a MEB includes 10,055 of the MEB's Marines, plus equipment and supplies for these 10,055 Marines.

The amphibious lift goal as approved by the Secretary of Defense has changed numerous times since the Korean War, reflecting changes in strategic or budgetary circumstances. One such change occurred in 1991, as the Cold War was ending.[10] The most recent change occurred in 2006, when the goal was reduced from 2.5 MEB AEs to 2.0 MEB AEs. **Table 1** shows amphibious lift goals since 1980.

Table 1. Amphibious Lift Goals Since 1980

Year	Goal	Troops[a]
1980	1.15 MEFs[b]	66,252
1981	1 MEF AE + 1 MEB	53,240
1982	1 MEF AE + 1 MEB AE	46,810
1991	2.5 MEB AEs	33,793
2006	2.0 MEB AEs	23,016

Sources: For list of amphibious lift goals prior to 2006: Matthew T. Robinson, *Integrated Amphibious Operations Update Study, (DoN Liftt 2+)—A Short History of the Amphibious Lift Requirement*, Center for Naval Analyses, Alexandria (VA), CRM D0005882.A3/Final, July 2002, p. 2 (Table 2). For troop levels associated with each lift goal: Marine Corps data provided to CRS on May 2, 2008.

a. Troop totals shown include a Navy Support Element (NSE) consisting of Navy units that help to move the Marines' equipment and supplies from ship to shore. In the case of the 2006 goal for 2.0 MEB AEs, the total of 23,016 troops includes an NSE of 2,906 Navy personnel.

b. MEF stands for Marine Expeditionary Force—a Marine air-ground task force with more than twice as many troops as a MEB.

[9] Unless otherwise noted, information in this section is based on a briefing from Marine Corps officials to CRS on April 25, 2008, and on Marine Corps point papers provided to CRS in association with this briefing.

[10] Key events marking the end of the Cold War include fall of the Berlin Wall in November 1989 and the disintegration of the Soviet Union in December 1991.

In discussions of the current 2.0 MEB AE amphibious lift goal, the "AE" part is often dropped for convenience, even though the current requirement still relates to MEB AEs rather than complete MEBs.

Marine Corps officials state that the 2006 reduction in the amphibious lift goal to 2.0 MEB AEs is acceptable because the Navy and Marine Corps also plan to field a new squadron of 14 next-generation maritime prepositioning force ships called the Maritime Prepositioning Force of the Future, or MPF(F). The planned 14-ship MPF(F) squadron, which is to include three modified LHA/LHD-type ships and 11 sealift (i.e., cargo-transport) ships, is to have a capability for putting an additional MEB ashore. Unlike the amphibious ship force, the MPF(F) squadron is not intended as assault shipping—the sealift ships in the MPF(F) squadron have less survivability and self-defense capability than the Navy's amphibious ships, and are therefore considered unsuitable for use in forcible-entry operations. MPF(F) ships, however, are in general less expensive to procure than amphibious ships, and they are designed to remain prepositioned at sea in a theater of interest for long periods of time before returning the port for maintenance. Together, the Navy's amphibious ship force and the MPF(F) squadron are to provide a total of 3.0 MEB AEs of lift, or 30,165 troops.

Translated into Numbers of Amphibious Ships

The Marine Corps states the 2.0 MEB AE amphibious lift goal translates into a requirement for a force of 33 amphibious ships, including

- 11 LHAs/LHDs,
- 11 LSD-41/49 class ships, and
- 11 LPD-17s.

In explaining how the requirement for 2.0 MEB AEs translates into this 33-ship requirement, the Marine Corps states the following:

- Given the lift capabilities of the Navy's current amphibious ships, each MEB AE would require 19 operational amphibious ships to lift: 6 LHAs/LHDs, 7 LSD-41/49s, and 6 LPD-17s.
- To arrive at a more fiscally constrained goal, the Marine Corps reduced the above 19-ship total to 17 operational ships: 5 LHAs/LHDs, 7 LSD-41/49s, and 5 LPD-17s. This 17-ship force requires about 11% of the MEB AE's vehicles to be shifted to the AFOE, which creates a degree of operational risk. This 17-ship force was presented to Navy officials in mid-2007.
- To arrive at a still-more fiscally constrained goal, Navy and Marine Corps officials in mid-2007 agreed to reduce the 17-ship total to 15 operational ships—5 of each kind. This 15-ship force requires about 20% of the MEB AE's vehicles and about 12% of its cargo to be shifted to the AFOE, which creates an additional degree of operational risk.

The Marine Corps testified in April 2008 that:

> Each MEB AE requires seventeen amphibious warfare ships.... However, given current fiscal constraints, *the Navy and Marine Corps have agreed to assume a degree of operational risk by limiting the assault echelon of each MEB by using only fifteen ships per MEB....* [11]

Table 2 shows the five elements of the amphibious lift footprint, and how limiting each MEB AE to 17 or 15 operational ships results in some of the MEB AE's vehicles and cargo being shifted to the AFOE.

Table 2. MEB AE Lift Elements

	Operational ships per MEB AE			% of lift element shifted to AFOE	
Lift element	19 ships (full MEB AE)	17 ships (somewhat fiscally constrained)	15 ships (more fiscally constrained)	with 17 ships per MEB AE	with 15 ships per MEB AE
Troop berthing	10,055	10,055	10,055	—	—
Vehicle storage space (square feet)	352,340	312,601	281,694	11.3%	20.1%
Cargo storage (cubic feet)	553,009	553,009	486,638	—	12.0%
VTOL aircraft operating spots	254	254	254	—	—
LCAC operating spots	24	24	24	—	—

Source: Table prepared by CRS based on Marine Corps data provided by telephone to CRS on April 29, 2008.

Notes: VTOL means vertical takeoff and landing. LCAC means air-cushioned landing craft.

Using 15 operational ships per MEB AE, providing lift for 2.0 MEB AEs would require 30 operational ships: 10 LHAs/LHDs, 10 LSD-41/49s, and 10 LPD-17s. The Marine Corps states that, in light of ship maintenance requirements, maintaining a force of 30 operational ships (i.e., ships not in maintenance) would require having an additional 15% in total inventory, meaning a total of 34.5 ships (11.5 of each kind) for 2.0 MEB AEs. The figure of 34.5 ships, the Marine Corps states, was then rounded down to 33 ships (11 of each kind).[12]

Table 3 shows the total number of amphibious ships that the Marine Corps states would be needed to lift 2.0 MEBs (the current goal), 2.5 MEBs (the goal from 1991 to 2006), and 3.0 MEBs (the broader current goal currently being met through a combination of amphibious and MPF[F] ships), using 15, 17, or 19 operational ships per MEB AE, and including an additional allowance to account for ships in maintenance. The first column shows the current 33-ship requirement for 2.0 MEB AEs using 15 operational ships per MEB.

[11] Statement of Lieutenant General James F. Amos, Deputy Commandant of the marine Corps (Combat Development and Integration), Before the Senate Armed Services Committee Subcommittee on Seapower, Concerning Shipbuilding and Force Structure on April 08, 2008, pp. 6-7. Italics as in the original.

[12] As shown in **Appendix A**, the Marine Corps alternatively has stated that in light of ship maintenance requirements, maintaining a force of 30 operational ships would require having an additional 10% in total inventory, meaning a total of 33 ships (11 of each kind).

Table 3. Ships Required for Various Potential Lift Goals

(including allowance for ships in overhaul)

	2.0 MEB AEs			2.5 MEB AEs			3.0 MEB AEs		
Operational ships per MEB AE[a]	**15**	**17**	**19**	**15**	**17**	**19**	**15**	**17**	**19**
LHA/LHD[a]	11	11	13	14	14	17	17	17	20
LSD-41/49[a]	11	13	15	14	16	19	16	20	23
LPD-17[a]	11	13	13	14	16	16	16	20	20
Total[a]	**33**	**37**	**41**	**42**	**46**	**52**	**49**	**57**	**63**

Source: Table prepared by CRS based on Marine Corps data provided to CRS on May 1, 2008.

a. Required numbers of ships shown include additional allowance to account for ships in maintenance, so as to support 15, 17, or 19 operational ships per MEB AE.

Table 3 shows a total of 37 amphibious ships would be needed to meet the 2.0 MEB AE using 17 amphibious ships per MEB. In April 2009 testimony to Congress, the Navy revised this figure to 38 ships, including 17 ships for each MEB plus four (rather than three) additional ships to account for 10% to 15% of the amphibious ship force being in overhaul at any given time.[13]

Relationship to Marine Corps End Strength

The Marine Corps is currently implementing a plan to increase its active-duty end strength from about 180,400 at the end of FY2007 to 202,000 by the end of FY2011. Marine Corps end strength, like the amphibious lift goal, has changed over time. Changes in Marine end strength do not necessarily imply parallel changes in the amphibious lift goal. Marine Corps officials have not argued that the current expansion in Marine Corps end strength calls for increasing the amphibious lift goal.

April 2008 Marine Corps Testimony

For additional discussion of the amphibious lift goal, see **Appendix A**, which presents April 2008 Marine Corps testimony on the topic.

Programmed Amphibious Force Under FY2009 Budget[14]

Although the Marine Corps states that a 33-ship amphibious force including 11 LPD-17s would be needed to minimally meet the amphibious lift goal, the Navy's 313-ship plan calls for a 31-

[13] Statement of Vice Admiral Bernard J. McCullough, Deputy Chief of Naval Operations for Integration of Capabilities and Resources, and Ms. Allison Stiller, Deputy Assistant Secretary of the Navy (Ship Programs), before the Subcommittee on Defense of the House Appropriations Committee [hearing] on Shipbuilding, April 1, 2009, p. 7. See also McCullough's spoken testimony at the hearing.

[14] The Navy's proposed FY2010 budget was submitted as a single-year budget, without an accompanying Future Years Defense Plan (FYDP) for the period FY2010-FY2015 or a 30-year shipbuilding plan for the period FY2010-FY2039. The discussion in this section is consequently based on the FY2009-FY2013 FYDP and FY2009-FY2038 30-year shipbuilding plan.

ship amphibious force including 10 LPD-17s. In discussing the 31-ship objective, the Navy's February 2008 report on the Navy's FY2009 30-year shipbuilding plan stated that the Department of the Navy "is reviewing options to increase assault echelon amphibious lift to 33 ships to meet USMC requirements."[15] The report also states:

> The Commandant of the Marine Corps has determined that a minimum of 33 amphibious ships is necessary to support their assault echelon lift requirements; specifically, he has requested a force of 11 aviation capable amphibious ships, 11 LPDs and 11 LSDs. The Chief of Naval Operations supports the Commandant's determination.[16]

Although the Navy's planned 313-ship fleet includes a 31-ship force including 10 LPD-17s, the Navy's FY2009 30-year (FY2009-FY2038) shipbuilding plan, if implemented, would achieve and maintain an amphibious force of 32 or 33 ships (the number varies from year to year) including nine LPD-17s. This 32- or 33-ship force also includes the 12 existing LSD-41/49 class ships and assumes service life extensions for certain existing amphibious ships.[17]

Table 4 shows the Marine Corps' calculation of the amount of amphibious lift, relative to the 2.0 MEB lift goal, resulting from this 32- or 33-ship amphibious force. The table presents the five different elements of amphibious lift. In the table, a figure of 1.0 in a cell would meet 100% of the 2.0 MEB lift goal for that lift element, a figure of 1.5 would exceed by 50% the 2.0 MEB lift goal for that element, and a figure of 0.75 would meet 75% of the 2.0 MEB lift goal for that element.

Table 4. Amphibious Lift Under FY2009 30-Year Plan

	2008	2009	2010	2015	2020	2025	2030	2035
Troops	1.46	1.35	1.38	1.45	1.42	1.35	1.49	1.59
Vehicle (sq. ft.)	0.77	0.75	0.80	0.90	0.88	0.93	1.05	1.17
Cargo (cu. ft.)	2.02	1.90	1.92	2.07	2.04	1.95	2.28	2.49
VTOL aircraft	1.02	0.93	0.94	1.07	1.06	0.97	1.18	1.31
LCACs	1.81	1.75	1.79	1.79	1.75	1.77	1.65	1.50

Source: U.S. Marine Corps calculations provided to CRS, March 11, 2008. The calculations are based on a MEB that is sized to be carried aboard 15 amphibious ships.

As can be seen in the table, the Marine Corps calculates that the projected 32- or 33-ship amphibious force would

[15] U.S. Navy, *Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY 2009*, p. 5.

[16] U.S. Navy, *Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY 2009*, p. A-3.

[17] Amphibious ships typically have service lives of 35 or 40 years. The Navy's report on the FY2009 30-year shipbuilding plan assumes service life extensions for four existing amphibious ships—two LPD-4s whose service lives are to be extended to 45 years and 47 years, and two LHA-1s, whose service lives are to be extended 43 years. (Department of the Navy, *Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY 2009*, Washington, 2008 (February 2008), p. A-3.) In addition, CBO testified in March 2008 that the plan also appears to assume an extension of the service lives of the 12 LSD-41/49 class ships from an earlier goal of 38 years to a new goal of 42 years. (CBO testimony, Statement of Eric J. Labs, Senior Analyst, [on] Current and Projected Navy Shipbuilding Programs, before the Subcommittee on Seapower and Expeditionary Forces, Committee on Armed Services, U.S. House of Representatives, March 14, 2008, p. 27.)

- roughly meet the lift goal for VTOL aircraft spaces;
- exceed the lift goal for troops, space for cargo, and spaces for LCAC landing craft; and
- fall short of meeting the lift goal for space for vehicles.[18]

The projected shortfall in space for vehicles, the Marine Corps says, would mean that the 32- or 33-ship amphibious force would not be able, by itself, to simultaneously land 2.0 fully equipped MEB AEs.

The Navy's report on the FY2009 30-year shipbuilding plan states that:

> While the mix of the 33 [amphibious] ships reflected in this plan differs slightly from the USMC requirement, it represents acceptable risk considering the amphibious ships planned for decommissioning are not scheduled for dismantling or sinking to permit mobilization at a later date if required. The decommissioning ships are being replaced with newer more capable LPD 17 and LHA 6 class ships. The Navy will maintain the 33-ship requirement for amphibious shipping through the FYDP while these new ships are integrated into the battleforce. Consequently, there will be no amphibious ship capability gaps through at least FY 2019.[19]

LPD-17 Program

Replacements for Older Amphibious Ships

The Navy initiated the LPD-17 program in the 1990s to provide replacement ships for the Navy's aging Austin (LPD-4) class amphibious ships, which entered service between 1965 and 1971, and three other older classes of amphibious ships that have already been removed from Navy service.

Construction Shipyards

LPD-17s are built primarily by the Avondale shipyard near New Orleans, LA, and the Ingalls shipyard near Pascagoula, MS, that form part of Northrop Grumman Shipbuilding (NGSB).[20]

[18] Although a surplus is projected in space for cargo, that surplus is not useable for storing vehicles because vehicles can't move into or out of that space.

[19] U.S. Navy, *Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY 2009*, p. A-3.

[20] Portions of LPD-17s are built at a fabrication facility at Gulfport, MS, that forms another part of NGSB. NGSB subcontracted portions of some early LPD-17s to a shipyard in Texas operated by Signal International (www.signalint.com), and more recently has subcontracted portions of LPD-24 (i.e., the eighth LPD-17) to General Dynamics' Bath Iron Works shipyard of Bath, ME. Parts of LPD-24 are also being built at Newport News Shipbuilding, of Newport News, VA, another yard that forms part of NGSB. (See Peter Frost, "Labor Market, Schedule Forces Outsourcing of Work," *Newport News Daily Press*, April 1, 2008; Holbrook Mohr, "Northrop Gets LPD Help From General Dynamics," *NavyTimes.com*, April 1, 2008; and Geoff Fein, "Northrop Grumman Awards Bath Iron Works Construction Work On LPD-24," *Defense Daily*, April 2, 2008.)

Procurement Profile

As shown in **Table 5**, the first LPD-17 was procured in FY1996, and a total of ten have been procured through FY2009. (The 10th ship, procured in FY2009, was partially funded in FY2009. The remainder of its procurement cost has been requested in the Navy's proposed FY2010 budget.) As of the end of FY2008, the first four LPD-17s had entered service.

Table 5. LPD-17 Procurement, FY1996-FY2009

96	97	98	99	00	01	02	03	04	05	06	07	08	09
1	0	0	1	2	0	0	1	1	1	1	0	1	1

Cost Growth, Schedule Delays, and Construction Problems

The LPD-17 program has experienced considerable cost growth, schedule delays, and construction problems, particularly on the earlier ships in the program. The first ship in the program experienced cost growth of about 70%, and later ships in the program were substantially more expensive to build than originally estimated. The design and construction of the first ship were delayed by about two years. Delays in building the first ships were a primary reason for the FY2001-FY2002 hiatus in LPD-17 procurement shown in **Table 5**. The first and second ships were delivered to the Navy in incomplete form, and numerous construction problems were identified on the first two ships. Fewer problems have been reported for subsequent ships in the program, and Navy officials now believe the program is stabilizing. For additional details, see **Appendix B**.

LPD-17 Program Funding in Proposed FY2010 Budget

The Navy's proposed FY2010 budget requested $872.4 million in procurement funding to complete the cost of the 10th LPD-17, which was authorized but only partially funded in FY2009. The FY2010 budget estimates the procurement cost of this ship at $1,852.5 million. The ship has received $980.1 million in prior-year funding, most of which was provided in FY2009. The proposed FY2010 budget also requested $184.6 million in advance procurement (AP) funding for an 11th LPD-17 class ship to be procured in FY2011.

Issues for Congress

Procuring an 11th LPD-17 in FY2010 Rather Than FY2011

One potential issue for Congress in FY2010 was whether to authorize and fund (or partially fund) the procurement of an 11th LPD-17 in FY2010 rather than FY2011. In considering this issue, Congress could consider several factors, including the following:

- the comparative costs of procuring an 11th LPD-17 in FY2010 or FY2011;
- the comparative impact on the shipbuilding industrial base of procuring an 11th LPD-17 in FY2010 or FY2011;

- the potential impacts on funding for other defense programs of procuring an 11th LPD-17 in FY2010 or FY2011; and
- the potential for building additional LPD-17s (or ships based on the LPD-17 hull) after the 11th LPD-17, and when such additional ships might be procured.

Regarding the fourth point above, the Navy has considered whether to use the LPD-17 hull as the basis for the Navy's planned JCC(X) joint command ship, which the Navy wants to procure in FY2012, and for the LSD(X), the Navy's projected replacement for the LSD-41/49 class ships. In addition, both CBO and Robert Work have suggested the option of building a naval gunfire support version of the LPD-17 hull. (Work made the suggestion in his capacity as an analyst at the Center for Strategic and Budgetary Assessments, or CSBA. In late-May 2009, Work became the Under Secretary of the Navy.)[21]

Appropriateness of 2.0 MEB AE Amphibious Lift Goal

Factors to Consider

In assessing the issue of whether the Marine Corps' 2.0 MEB AE amphibious lift goal is appropriate, Congress may consider several factors, including those discussed below.

Future Security Environment

Changes in the international security environment could affect future demands for amphibious ships for performing various missions. Changes in the political or military situation on the Korean Peninsula, for example, could affect demands for amphibious ships for potential use in Korean Peninsula conflict scenarios, while changes in population patterns, weather patterns, commodity prices, or the policies of foreign governments could affect future demands for amphibious ships for performing disaster-response or humanitarian-assistance operations.

Potential to Meet Demands with Other Forces

It is possible that certain demands for U.S. Navy amphibious ships might be met in other ways—for example, by other U.S. forces or by allied or coalition military forces. The U.S. Army has forcible-entry forces such as such as the 82nd Airborne Division, and the U.S. Army and U.S. Air Force have substantial logistics capabilities for conducting disaster-response and humanitarian-relief operations. The capabilities and limitations of amphibious ships, however, differ from those of other U.S. forces. Consequently, depending on the military or geographic circumstances, using amphibious ships might be the preferred option (or the only option) for conducting certain operations. In addition, other U.S. forces have their own mission responsibilities and consequently might not always be available to act as substitutes for amphibious ships.

Some allied or coalition navies include amphibious ships that are potentially suitable for meeting demands that might otherwise be met by U.S. Navy amphibious ships. The number of amphibious

[21] For more on the option of a naval gunfire support version of the LPD-17 hull, including citations from CBO and CSBA reports, see CRS Report RL32109, *Navy DDG-51 and DDG-1000 Destroyer Programs: Background and Issues for Congress*, by Ronald O'Rourke.

ships in these navies, however, is relatively small, and the capabilities of these ships are not always equal to that of U.S. Navy amphibious ships. In addition, foreign amphibious ships might not always be available to perform operations of interest to the United States, either because they are in maintenance or already committed to performing other missions, or because the allied or coalition governments for their own reasons do not want their amphibious ships to be used for the missions in question. Even when foreign amphibious ships are available for conducting an operation, U.S. officials might still prefer to conduct it with U.S. Navy amphibious ships so that the United States can receive the political credit for conducting it.

Reduction in Operational Ships per MEB

As mentioned earlier, the Marine Corps testified in April 2008 that, in limiting each MEB AE to 15 ships, the Navy and Marine Corps agreed to assume a degree of operational risk. As shown in **Table 3**, using 17 or 19 operational amphibious ships per MEB AE, so as to reduce operational risk, would generate a goal for an amphibious force of more than 33 ships, including more than 11 LPD-17s.

Competing Demands for Funding

In a situation of constrained defense resources, increasing the amphibious lift goal could reduce the amount of funding available for other Navy or DOD funding priorities. Conversely, reducing the amphibious lift goal could increase the amount of funding available for other Navy or DOD priorities. Constraints on defense resources could require making tradeoffs between various defense program goals.

October 2008 Press Report

In October 2008, it was reported that a draft version of a Navy document called the Naval Operational Concept (NOC) suggests increasing the planned size of the amphibious fleet by adding a second LPD to each deployed amphibious ready group (ARG)—a proposal that, if implemented, would increase the planned size of the amphibious force, and the planned number of LPD-17s, by a few or several ships. The press report on the draft NOC stated that:

> The Force Structure Data Sheet [associated with the draft NOC) appears to link numbers of certain ship types with requirements as stated in the draft NOC, but contains a number of areas where information is incomplete. Among its highlights:...
>
> —The ideal Amphibious Ready Group (ARG) to transport a Marine Expeditionary Unit (MEU) is four ships: a big-deck assault ship (LHA or LHD), a dock landing ship (LSD) and two amphibious transport dock ships (LPD)—one with enhanced command and control capabilities. This is an expansion of the 3-ship formation that has been used over the past decade. The four-ship ARG would "support split operations by a two-section ARG/MEU" and "provide the ability to more widely disperse the platforms that carry the Marines and the ability to embark more capability on the smaller, dispersed entities." To meet this need, the amphibious ship requirement would need to be raised from the current 32 ships to 36. The use of amphibious ships to support special operations forces and mine countermeasures forces also pushes the requirement to 36 ships, the document said.
>
> —The value of using amphibious ships to support the five Global Fleet Stations [GFSs] locations further pushes the number of "gators;" assuming that at any time two ships would

be deployed on GFS missions and ten percent of the force would be in maintenance, a fleet of 42 amphibs is needed.[22]

June 2009 Press Report

A June 2009 press report stated:

> Much of the current fleet has the capability to perform newer irregular warfare missions, a point which will be key as the Navy determines the right balance of the force—including amphibious lift—in the upcoming Quadrennial Defense Review, the service's top requirements officer said last week.
>
> "When I look at the flexibility of the naval platforms, I think they are full-spectrum platforms that can contribute across all areas," Vice Adm. Barry McCullough, the deputy chief of naval operations for integration of capabilities and resources, said in a May 27 interview at his Pentagon office. "And so we need to fit within the prescribed guidance that [Defense Secretary Robert Gates] put out, and that's what we're working on for balance."...
>
> McCullough said his worry is that the Navy's irregular warfare capacity has become too narrowly focused on Navy Expeditionary Combat Command, an umbrella for expeditionary capabilities such as explosive ordnance disposal, riverine and naval construction units known as Seabees....
>
> Amphibious ships are also "ideally suited" for irregular warfare missions, McCullough said, echoing a sentiment voiced by Chief of Naval Operations Adm. Gary Roughead in an April 25 meeting with reporters. The Austin-class amphibious dock ship Nashville (LPD-13) just completed a deployment to the Gulf of Guinea region of West Africa for maritime security training and outreach to several African nations, an endeavor known as Africa Partnership Station.
>
> While some have argued that acquiring more coastal patrol boats or 178-foot patrol ships is the right approach to security cooperation missions like APS, McCullough countered that their small size and small crew are limiting.
>
> "If you send an amphibious ship, you can interact with a multitude of people in the area where you're trying to conduct theater security cooperation or engagement, and you can train a large a majority of those people, because you can bring their craft to your ship or their people to your ship to interact," he said. "So then you've got an ability to influence a much broader spectrum of audience."
>
> The requirement for amphibious lift is one of the areas that will be examined in the QDR. In April, Roughead stated his hope that amphibious force structure, and the expanded use of amphibious ships for cooperative security engagements, would be among the key topics that would be discussed....
>
> McCullough said he does not believe the QDR will determine a specific number of amphibious ships, but rather how many Marine Expeditionary Brigades are needed in the assault echelon, "and what's the appropriate lift to get that capability to where it needs to be to execute its mission," he said.

[22] Christopher P. Cavas, "U.S. Navy Drafting 'Naval Operational Concept,'" *Defense News*, October 21, 2008. "Gator," as in alligator, in an informal term for an amphibious ship. For more on Global Fleet Stations, see CRS Report RS21338, *Navy Ship Deployments: New Approaches—Background and Issues for Congress*, by Ronald O'Rourke.

> "So it won't tell me to build 32 ships as opposed to 38 or 28 instead of 34," he said, noting the numbers were examples. "I think the guidance will be less directive than that. But it will be ... the Navy and the Marine Corps need to provide an amphibious lift to lift 1.0 or 2.0 or 1.8 equivalent MEBs."
>
> That question must also be considered within the larger context of the best balance of the force overall.
>
> "While we agree on requirements—and the Navy and Marine Corps are pretty aligned on that—we have to balance the capability and the capacity we need within fiscal controls," he said. "And that's a challenge."[23]

Legislative Activity for FY2010

FY2010 Funding Request

The Navy's proposed FY2010 budget requested $872.4 million in procurement funding to complete the cost of the 10th LPD-17, which was authorized but only partially funded in FY2009. The FY2010 budget estimates the procurement cost of this ship at $1,852.5 million. The ship has received $980.1 million in prior-year funding, most of which was provided in FY2009. The proposed FY2010 budget also requested $184.6 million in advance procurement (AP) funding for an 11th LPD-17 to be procured in FY2011.

FY2010 Defense Authorization Act (H.R. 2647/P.L. 111-84)

House

The House Armed Services Committee, in its report (H.Rept. 111-166 of June 18, 2009) on H.R. 2647, recommends approving the Navy's request for procurement funding for the 10th LPD-17, and increasing by $60 million the Navy's request for advance procurement funding for an 11th LPD-17 to be procured in FY2011. (Page 70, lines 014 and 015) The committee states in its report that it "is encouraged that the Department of the Navy has requested funding to complete the last two of the Lewis and Clark dry cargo ammunition ships (T–AKE) and the final [i.e., 11th] LPD 17 ship." (Page 72)

Senate

Division D of the FY2010 defense authorization bill (S. 1390) as reported by the Senate Armed Services Committee (S.Rept. 111-35 of July 2, 2009) presents the detailed line-item funding tables that in previous years have been included in the Senate Armed Services Committee's report on the defense authorization bill. Division D recommends approving the Navy's request for procurement funding for the 10th LPD-17 and advance procurement funding for an 11th LPD-17 to be procured in FY2011. (Page 619, lines 014 and 015 of the printed bill.)

[23] Rebekah Gordon, "McCullough: Current Fleet Meets Many Irregular Warfare Missions," *Inside the Navy*, June 1, 2009.

Conference

The conference report (H.Rept. 111-288 of October 7, 2009) on H.R. 2647 recommends approving the Navy's request for procurement funding for the 10th LPD-17 and advance procurement funding for an 11th LPD-17 to be procured in FY2011. (Page 939)

FY2010 DOD Appropriations Act (H.R. 3326/P.L. 111-118)

House

The House Appropriations Committee, in its report (H.Rept. 111-230 of July 24, 2009) on H.R. 3326, recommends approving the Navy's request for procurement funding for the 10th LPD-17, and approving the Navy's request for advance procurement funding for an 11th LPD-17 to be procured in FY2011. (Page 163)

Senate

The Senate Appropriations Committee, in its report (S.Rept. 111-74 of September 10, 2009) on H.R. 3326, recommends approving the Navy's request for procurement funding for the 10th LPD-17, and approving the Navy's request for advance procurement funding for an 11th LPD-17 to be procured in FY2011. (Page 112) The committee's report states:

> *Common Hull Form.*—The Committee remains concerned about the Navy's ability to maintain an adequate fleet and deliver on its shipbuilding program, and build ships on time and on budget. The Chief of Naval Operations pointed out in testimony before the Committee, common hull forms and repeat build of ships that permit longer production runs will reduce construction costs. The Committee supports efforts that control ship costs and help maintain production schedules.
>
> The Committee understands there has been discussion within the Department of the Navy about using the LPD–17 hull as a common hull option for the LCC(R) joint command ship and the LSD(X) dock landing ship replacement programs. The amphibious LPD–17 class ship is a hull form that is at a mature stage of production and should be strongly considered for this commonality approach. Therefore, the Committee directs the Secretary of the Navy to submit a report to the congressional defense committees no later than March 15, 2010, that describes the benefits of using the LPD hull form as a replacement for these ship classes to include estimated cost savings of procuring these ships under a multi-year procurement authority. (Page 114)

Final Version

In lieu of a conference report, the House Appropriations Committee on December 15, 2009, released an explanatory statement on a final version of H.R. 3326. This version was passed by the House on December 16, 2009, and by the Senate on December 19, 2009, and signed into law on December 19, 2009, as P.L. 111-118. The explanatory statement states on page 1 that it "is an explanation of the effects of Division A [of H.R. 3326], which makes appropriations for the Department of Defense for fiscal year 2010. As provided in Section 8124 of the consolidated bill, this explanatory statement shall have the same effect with respect to the allocation of funds and the implementation of this as if it were a joint explanatory statement of a committee of the conference."

The explanatory statement approves the Navy's FY2010 request for procurement and advance procurement funding for the LPD-17 program. (Page 165) The explanatory statement also states:

> COMMON HULL FORMS
>
> The Navy has discussed in testimony the use of existing hull forms for the design of future ships in an effort to reduce the cost of these ships. Candidate ships include, but are not limited to the replacement command ship, future dock landing ships, future surface combatant, and hospital ships. Candidate hull forms include, but are not limited to, the LPD-17, TAKE, National Security Cutter, Patrol Coastal and DDG-51 hull forms all currently in use. This initiative continues to have strong support and the Secretary of the Navy is directed to submit a report that outlines the benefits of using an existing hull form for future ship construction. The report should include candidate hull forms, candidate ship classes (including survivability requirements), potential cost savings (including under multiyear procurement authority), and the timeframe of when the decision would be made to use an existing hull form for future designs. This report should be submitted to the congressional defense committees not later than March 15th, 2010. (pages 167-168)

Appendix A. Marine Corps 2008 Testimony on Amphibious Lift Goal

Regarding the amphibious lift goal, the Marine Corps testified in April 2008 as follows:

> Shipbuilding Requirements
>
> Based on strategic guidance, in the last several years the Navy and Marine Corps have accepted risk in our Nation's forcible entry capacity, and reduced amphibious lift from 3.0 MEB assault echelon (AE) to 2.0 MEB AE. In the budgetary arena, the value of amphibious ships is too often assessed exclusively in terms of forcible entry—discounting their demonstrated usefulness across the range of operations and the clear imperative for Marines embarked aboard amphibious ships to meet Phase 0 demands. The ability to transition between those two strategic goalposts, and to respond to every mission-tasking in between, will rely on a strong Navy-Marine Corps Team and the amphibious ships that facilitate our bond. The Navy and Marine Corps have worked diligently to determine the minimum number of amphibious ships necessary to satisfy the Nation's needs.
>
> The Marine Corps' contribution to the Nation's forcible entry requirement is a single, simultaneously-employed two MEB assault capability—as part of a seabased MEF. Although not a part of the MEF AE, a third reinforcing MEB is required and will be provided through MPF(F) shipping. Each MEB AE requires seventeen amphibious warfare ships—resulting in an overall ship requirement for thirty-four amphibious warfare ships. However, given current fiscal constraints, *the Navy and Marine Corps have agreed to assume a degree of operational risk by limiting the assault echelon of each MEB by using only fifteen ships per MEB*—in other words, a Battle Force that provides thirty "operationally available" amphibious warfare ships.
>
> Amphibious Ships
>
> In that thirty-ship Battle Force, ten aviation-capable big deck ships (LHA / LHD / LHA(R)), ten LPD 17 class ships, and ten LSD class ships are required to accommodate the MAGTF [Marine Air-Ground Task Force] capabilities. In order to meet a thirty-ship availability rate—based on a CNO-approved maintenance factor of ten percent—a minimum of eleven ships of each of the current types of amphibious ships are required—for a total of thirty-three ships. The CNO has concurred with this requirement for thirty-three amphibious warfare ships, which provide the "backbone" of our maritime capability—giving us the ability to meet the demands of harsh environments across the spectrum of conflict.
>
> The LPD 17 San Antonio class of amphibious warfare ships represents the Department of the Navy's commitment to a modern expeditionary power projection fleet enabling our naval force to operate across the spectrum of warfare. The LPD 17 class replaces four classes of older ships—LKA, LST, LSD 36, LPD 4—and will have a forty-year expected service life. It is imperative that eleven of these ships be built to meet the minimum of ten necessary for the 2.0 MEB AE amphibious lift requirement. Procurement of the tenth and eleventh LPDs remains a priority.[24]

[24] Statement of Lieutenant General James F. Amos, Deputy Commandant of the Marine Corps (Combat Development and Integration), before the Senate Armed Services Committee Subcommittee on Seapower, Concerning Shipbuilding and Force Structure, April 8, 2008, pp. 6-7. Italics as in the original.

Appendix B. LPD-17 Cost Growth and Construction Problems

This appendix provides details on cost growth and construction problems in the LPD-17 program.

Cost Growth

The Congressional Budget Office (CBO) testified in July 2007 that the first LPD-17 experienced cost growth of about 70% and is, on a per-ton basis, the most expensive amphibious ship ever built for the Navy.[25] When LPD-17 procurement began, follow-on ships in the class were estimated to cost roughly $750 million each. Estimated procurement costs for the follow-on ships subsequently grew to figures between about $1,200 million and about $1,500 million. The Navy estimates the procurement cost of the ninth ship at $1,782 million.

A relatively small portion of the cost growth in the program since its inception is attributable to the decision to reduce the program's sustaining procurement rate from two ships per year to one ship per year. Most of the program's cost growth is attributable to other causes.[26]

Construction Problems

The first LPD-17, which was procured in FY1996, encountered a roughly two-year delay in design and construction. It was presented to the Navy for acceptance in late June 2005. A Navy inspection of the ship conducted June 27-July 1, 2005, found numerous construction deficiencies.[27]

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[25] CBO Testimony, Statement of J. Michael Gilmore, Assistant Director for National Security, and Eric J. Labs, Senior Analyst, [on] The Navy's 2008 Shipbuilding Plan and Key Ship Programs, before the Subcommittee on Seapower and Expeditionary Forces, Committee on Armed Services, U.S. House of Representatives, July 24, 2007, pp. 13 and 20. CBO reiterated in March 2008 testimony and a June 2008 report that the first LPD-17 is, on a per-ton basis, the most expensive amphibious ship ever built for the Navy. (See CBO Testimony, Statement of Eric J. Labs, Senior Analyst, [on] Current and Projected Navy Shipbuilding Programs, before the Subcommittee on Seapower and Expeditionary Forces, Committee on Armed Services, U.S. House of Representatives, March 14, 2008, p. 27; and Congressional Budget Office, *Resource Implications of the Navy's Fiscal Year 2009 Shipbuilding Plan*, June 9, 2008, p. 31.

[26] RAND estimates that halving a shipbuilding program's annual procurement rate typically increases unit procurement cost by about 10%. (Mark V Arena, et al, *Why Has the Cost of Navy Ships Risen? A Macroscopic Examination of the Trends in U.S. Naval Ship Costs Over the Past Several Decades*. RAND, Santa Monica (CA), 2006. p. 45. (National Defense Research Institute, MG-484-NAVY). The December 2006 Selected Acquisition Report (SAR) summary table, available at http://www.acq.osd.mil/ara/am/sar/2006-DEC-SST.pdf, states that in then-year dollars, changes in the LPD-17 program's production schedule (including the reduction in annual procurement rate) account for $768.1million in increased costs for the program, or about 11.2% of the increased costs caused by all factors. The other factors leading to increased costs were economic errors (meaning errors in projected rates of inflation), which account for $361.7 million; estimating errors, which account for $4,648.8 million; and "other," which accounts for $1,093.4 million. The LPD-17 program's total cost was also reduced by $4,037.8 million because of the reduction in program quantity from an originally planned total of 12 ships to the currently planned total of 9 ships. The resulting net change in the program's estimated cost is an increase of $2,832.2 million.

[27] Associated Press, "Shipbuilder: Navy Will Accept New Vessel," *NavyTimes.com*, July 21, 2005; Christopher J. Castelli, "Naval Inspection Report Finds Numerous Problems With LPD-17," *Inside the Navy*, July 18, 2005; Dale Eisman and Jack Dorsey, "Problems On New Ship A Bad Sign, Analyst Warns," *Norfolk Virginian-Pilot*, July 14, 2005; Nathan Hodge, "Navy Inspectors Flag 'Poor Construction' On LPD-17," *Defense Daily*, July 14, 2005. A copy of the Navy's inspection report, dated July 5, 2005, is posted online at http://www.coltoncompany.com/
(continued...)

The Navy accepted delivery of LPD-17 with about 1.1 million hours of construction work remaining to be done on the ship. This equated to about 8.7% of the total hours needed to build the ship, and (with material costs included) about 7% of the total cost to build the ship.

The Navy accepted delivery of LPD-18 with about 400,000 hours of construction work remaining to be done on the ship. This equated to about 3.3% of the total hours needed to build the ship.

The Navy accepted delivery of LPD-19 with about 45,000 hours of construction work remaining to be done on the ship. This equated to about 0.4% of the total hours needed to build the ship.

The Navy stated that it accepted LPD-17 in incomplete condition for four reasons:

- It permitted the fleet to begin sooner the process of evaluating LPD-17 through operational use so as to identify problems with the LPD-17 class design that need to be fixed in follow-on LPD-17s.
- It avoided further delays in giving the LPD-17's crew an opportunity to conduct post-delivery tests and trial events that are intended to identify construction (as opposed to class design) problems with LPD-17 itself.
- It permitted LPD-17 to leave the shipyard sooner and thereby mitigated schedule and cost impacts on other ships being built at the shipyard (other LPD-17s, LHD-8, and DDG-51s) that would have resulted from having LPD-17 remain in the shipyard longer.
- It reduced the cost of the remaining construction work to be done on LPD-17 because the work in question could be performed by repair shipyards that charge lower rates for their work than the construction shipyard.

Of the approximately $160 million in post-delivery work performed on LPD-17, $108 million was for the 1.1 million hours of construction work remaining to complete the ship. (The rest was for post-shakedown and other work that normally occurs after a ship is completed and delivered to the Navy.) This $160 million in work was funded through the post-delivery part of the outfitting/post-delivery (OF/PD) line item in the Shipbuilding and Conversion, Navy (SCN) account. Because OF/DP costs are not included in ship end cost, the reported end cost of LPD-17 will understate the ship's actual construction cost by $108 million.

The Navy planned to fund post-delivery construction work on LPD-18 and LPD-19 through the completion of prior-year shipbuilding line item in the SCN account—a line item that is included in ship end cost.

The Government Accountability Office (GAO) testified in July 2007 that:

> The Navy moved forward with ambitious schedules for constructing LPD 17 and [the Littoral Combat Ship] despite significant challenges in stabilizing the designs for these ships. As a result, construction work has been performed out of sequence and significant rework has been required, disrupting the optimal construction sequence and application of lessons learned for follow-on vessels in these programs.

(...continued)

newsandcomment/comment/lpd17insurv.htm.

> In the LPD 17 program, the Navy's reliance on an immature design tool led to problems that affected all aspects of the lead ship's design. Without a stable design, work was often delayed from early in the building cycle to later, during integration of the hull. Shipbuilders stated that doing the work at this stage could cost up to five times the original cost. The lead ship in the LPD class was delivered to the warfighter incomplete and with numerous mechanical failures, resulting in a lower than promised level of capability. These problems continue today—2 years after the Navy accepted delivery of LPD 17. Recent sea trials of the ship revealed problems with LPD 17's steering system, reverse osmosis units, shipwide area computing network, and electrical system, among other deficiencies. Navy inspectors noted that 138 of 943 ship spaces remained unfinished and identified a number of safety concerns related to personnel, equipment, ammunition, navigation, and flight activities. To date, the Navy has invested over $1.75 billion constructing LPD 17.[28]

LPD-17 was commissioned into service on January 14, 2006. In April 2007, it was reported that the first LPD-17 had thousands of construction deficiencies.[29] In late June and early July 2007, it was reported that Secretary of the Navy Donald Winter had sent a letter to the chairman and chief executive officer of Northrop Grumman, Ronald Sugar, dated June 22, 2007, expressing deep concerns about NGSS's performance, particularly in connection with the LPD-17 program. According to these news reports, Winter's letter contained the following statements among others, although not necessarily in the order shown below:

- "I am deeply concerned about Northrop Grumman Ship Systems' (NGSS) ability to recover in the aftermath of Hurricane Katrina, particularly in regard to construction of LPD 17 Class vessels."
- "I am equally concerned about NGSS' ability to construct and deliver ships that conform to the quality standards maintained by the Navy and that adhere to the cost and schedule commitments agreed upon at the outset by both NGSS and the Navy."
- "... even prior to Katrina [NGSS's performance] was marginal, resulting in significant cost overruns that forces the Navy to take delivery of the LPD-17 with numerous outstanding deficiencies.... "
- "NGSS' inefficiency and mismanagement of LPD 17 put the Navy in an untenable position."
- "By taking delivery of ships with serious quality problems, the Fleet has suffered unacceptable delays in obtaining deployable assets. Twenty-three months after commissioning of LPD 17, the Navy still does not have a mission-capable ship."
- "These delays create further problems as work must be completed or redone by other shipyards that are not as familiar with the ship's design."
- "The Navy also took delivery of LPD-18 (USS New Orleans) in an incomplete fashion, albeit more complete than LPD-17."

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[28] Government Accountability Office, *Defense Acquisitions[:] Realistic Business Cases Needed to Execute Navy Shipbuilding Programs, Statement of Paul L. Francis, Director Acquisition and Sourcing Management Team, Testimony Before the Subcommittee on Seapower and Expeditionary Forces, Committee on Armed Services, House of Representatives*, July 24, 2007 (GAO-07-943T), p. 10.

[29] See, for example, Louis Hansen, "New Navy Ship San Antonio Found To Be Rife With Flaws," *Norfolk Virginian-Pilot*, April 14, 2007; Christopher P. Cavas, "Thousands of Problems Found On New Amphibious Ship," *DefenseNews.com*, April 23, 2007.

- "... persistent shortcomings at the NGSS yards are troubling and causing me not only grave concern about the LPD program, but also the LHA and DDG-1000 programs."
- "The Navy does not wish to find itself in the same situation [with other ships that] it faces with LPD 17 & 18."
- "It is imperative that NGSS deliver future ships devoid of significant quality problems and that it meet its cost and schedule obligations."
- One press report stated: "'Continued, focused management' is necessary to successfully deliver the remainder of the class, according to Winter."
- "[Navy acquisition executive] Dr. [Delores] Etter will be closely monitoring metrics with NGSS and the acquisition team as we move forward."[30]

Sugar reportedly sent a reply letter to Winter dated June 29, 2007. According to one press report, Sugar stated in the letter: "I share your concern regarding the need to fully recover and improve our shipyards, and produce completed LPD 17 class vessels of the highest quality with increasing efficiency.... Irrespective of Hurricane Katrina, Northrop has much work to do to meet the needs of the U.S. Navy."[31] Another press report stated:

> Northrop Grumman Corp (NOC) has 'much more work to do' to improve its performance on Navy ships, but problems with a $13.6-billion amphibious ship program were not solely the contractor's making, Chief Executive Ron Sugar said in a June 29 letter.
>
> "The original acquisition strategy was changed after contract award, there was funding instability, limited early funding for critical vendor information, and the 'integrated' Navy/contractor design team produced constant design churn and thousands of design changes," Sugar wrote, responding to a tersely worded letter from Navy Secretary Donald Winter.
>
> Northrop "certainly had performance problems," but the unprecedented effects of Hurricane Katrina, which severely damaged Northrop's three shipyards in the Gulf region in August 2005, "only served to greatly exacerbate the situation.... "
>
> Sugar said he shared Winter's concerns and vowed that Northrop would invest, train and manage its operations to produce Navy ships of the highest quality with increasing efficiency. "Irrespective of Hurricane Katrina, Northrop has much more work to do to meet the needs of the U.S. Navy."
>
> "We are not happy with this history," Sugar added in the letter obtained by Reuters, "but we are incorporating the lessons from this experience into our operational plans going forward for new ships in the design, planning and production stages."

[30] Sources for these reported passages from the June 22 letter: Louis Hansen, "Navy Ship $840 Million Over Budget And Still Unfinished," *Norfolk Virginian-Pilot*, June 30, 2007; Tony Capaccio, "Northrop Grumman Criticized For 'Mismanagement' By U.S. Navy, *Bloomberg News*, July 2, 2007; Geoff Fein, "Navy To Monitor Work At Northrop Grumman Gulf Coast Shipyards, Official Says," *Defense Daily*, July 5, 2007; Christopher P. Cavas, "U.S. Navy Furious Over LPD-17," *DefenseNews.com*, July 9, 2007. *InsideDefense.com* on July 9, 2007, posted on the subscribers-only portion of its website a copy of what it says is the June 22 letter.

[31] Christopher P. Cavas, "U.S. Navy Furious Over LPD-17," *DefenseNews.com*, July 9, 2007.

> He noted that Navy recently praised Northrop's work on a destroyer that was damaged by Hurricane Katrina, and termed it "one of the best ships ever delivered."
>
> Sugar said Northrop officials had given the Navy a list of efforts under way to improve training, quality, processes, productivity and facilities at the Gulf Coast shipyards. He promised "substantial investment," but gave no details.
>
> He said Northrop was aggressively reworking schedules for delivery of all ships affected by the hurricane. "We know we must do our part," Sugar said.[32]

After working to overcome construction problems, Navy officials in late-2007 stated that they were "cautiously optimistic" that the LPD-17 construction effort is stabilizing. A December 24, 2007, press report stated:

> As the Navy gears up for the first deployment of the new San Antonio-class amphibious transport dock slated for next year, a senior service shipbuilding official is "cautiously optimistic" the once-beleaguered program is on track....
>
> On Dec. 15, the Navy commissioned the third ship, the Mesa Verde, in Panama City, Fla. It was the first ship in the class to be delivered without significant problems.
>
> The San Antonio class faced difficulties beginning in late 1998, when the initial construction contract was awarded to Avondale Industries in New Orleans. Avondale beat out Litton Ingalls Shipbuilding primarily because it planned to use a new computer program to design the ships—the first time a Navy ship was designed entirety using computer tools. But the computer systems didn't work, the Navy kept making design changes, costs escalated and major delays ensued.
>
> Litton Ingalls bought Avondale in 1999, its owners mistakenly thinking they could fix the program, and in late 2000 the shipyards were acquired by Northrop Grumman.
>
> Meanwhile, a succession of service program managers and acquisition executives struggled to hold down the design changes and manage costs, which have more than doubled from the $750 million per ship the Navy forecast in the late 1990s.
>
> All those problems and more affected the first two ships of the class. The San Antonio was delivered, incomplete, in mid-2005. The Navy accepted the ship knowing it had numerous construction defects, many of which would need to be fixed at extra costs after the shipyard's obligation period ended. The next ship, the New Orleans, was delivered in December 2007, also with incomplete spaces. To make things more challenging, Hurricane Katrina had wreaked havoc on the New Orleans-based Avondale shipyard in 2005.
>
> Nevertheless, construction on the Mesa Verde, the third new ship, went more smoothly. The Mesa Verde was built at Northrop Grumman's Ingalls shipyard in Pascagoula, Miss....
>
> The Mesa Verde "sets a new standard for the LPD class as far as being a complete ship," Capt. Beth Dexter, the Navy's supervisor of shipbuilding in Pascagoula, told Military Times in September. "My Navy team is proud to present it."
>
> Robert Work, a naval analyst at the Center for Strategic and Budgetary Assessments in Washington, said it looks like the LPD 17 program is pulling away from its "checkered

[32] Andrea Shalal-Esa, "Northrop Says Katrina Exacerbated Ship Problems," *Reuters*, July 10, 2007.

> past." He said it appears the program is "getting back on track" and that it will be exciting to see the first ship as it enters the fleet.
>
> American shipbuilders have historically had difficulties with lead ships, he said....
>
> Stiller told Navy Times that after Hurricane Katrina the Navy re-established new milestones to measure the new ships' progress. So far, each ship under construction is meeting these marks, she said.
>
> "I believe we are turning the corner," Stiller said. In 2008, she said, she hopes the service and industry will be able to "not just meet but beat" these milestones.[33]

In August 2008, it was reported that the maiden deployment of LPD-17 was delayed by two days due to problems with a hydraulic system that controls the stern gate used to gain access to the ship's well deck.[34]

In August 2008, it was also reported that:

> Just under two years after the amphibious transport dock New Orleans [LPD-18] was delivered incomplete, the amphib still can't perform the central mission for which it was designed: Carrying Marines, their gear and their vehicles into battle, according to a recent report by the Navy's Board of Inspection and Survey, or InSurv.
>
> The San Diego-based New Orleans was "degraded" in its "ability to conduct sustained combat operations," and has a slew of other problems, according to the inspection, conducted Aug. 11-15. The report, obtained by *Navy Times*, paints the picture of a ship not only troubled by the same technical problems as its older sibling, the first-in-class gator San Antonio, but also with many of its own.
>
> "The ship cannot support embarked troops, cargo or landing craft," the report said. Navy engineers found "serious materials deficiencies in the well deck and vehicle stowage areas"; the well deck's ventilation fans didn't work; the vehicle ramps were inoperative; and berthing for Marines and the ships' crew was found to be unsatisfactory.
>
> Moreover, the ship's propulsion system was unreliable, causing a 10-hour delay before it could put to sea for its final contract trials. Much of its communications equipment didn't work. And when the ship tried to test its Rolling Airframe Missile launchers, both of them fired just one missile at their targets and then lost power, forcing crews to reset their computer systems.
>
> The New Orleans InSurv arrived just as the Norfolk, Va.-based San Antonio [LPD-17] is preparing to make its maiden deployment this week. That ship was delivered three years ago, also incomplete. Like the San Antonio, the New Orleans' electrical system had ship-wide problems, according to Navy inspectors: "Significant electrical and electronic cable plant installation deficiencies exist," Navy inspectors wrote, including "dead-ended cables, cables

[33] Zachary M. Peterson, "Troubled Amphib Program Appears On Track," *NavyTimes.com*, December 24, 2007. See also Dan Taylor, "Contract Awarded For Ninth LPD-17 As NGC Addresses Concerns," *Inside the Navy*, January 7, 2008; and Christopher P. Cavas, "Third Time Could Be the Charm for LPD Program," *Defense News*, September 10, 2007.

[34] Andrew Scutro, "Mechanical Failure Keeps Troubled Amphib At Pier," *NavyTimes.com*, August 26, 2008; Matthew Jones, "Troubled Ship's Departure Is Delayed By Gate Problem," *Norfolk Virginian-Pilot*, August 27, 2008; Dan Taylor, "After Delayed Start, Questions Abound on LPD-17s First Deployment," *September 1, 2008.*

> improperly bundled and banded, cables exceeding nesting capacity, inadequate packing of cables at watertight penetrations."
>
> The findings make for a total of three ships with widespread electrical problems that were built at Northrop Grumman's shipyards along the Gulf Coast: the first two San Antonios and the amphibious assault ship Makin Island [LHD-8]. Northrop Grumman announced earlier this year that it had to delay the delivery of the Makin Island by six months to fix its wiring problems. The company agreed to bear the roughly $360 million cost.
>
> Margaret Mitchell-Jones, a spokeswoman for Northrop Grumman, said the company did not comment on ships it has already delivered to the Navy, but in a written statement Tuesday, she said the San Antonio class was constantly improving:
>
> "While we don't comment on the capabilities of commissioned ships, we can say that with each LPD, we continue to make significant improvements in all areas and this includes the electrical systems. The latest LPD, Green Bay, will be delivered this week to the U.S. Navy and, from a material and systems standpoint, was more complete than any other LPD at acceptance trials. This is a testament to the benefits of series ship production and our ability to come down the learning curve resulting in greater efficiencies."[35]

In September 2008, it was reported that:

> After facing a bevy of negative survey results for the first two LPD-17-class ships, the Navy appears to be headed in the right direction, moving away from incomplete work and into serial production, a Navy official said.
>
> Earlier this year, the USS New Orleans (LPD-18) came under fire for a poor showing by the Navy's Board of Inspection and Survey (InSurv). Last year, the USS San Antonio (LPD-17), the lead ship of the new class of ambitious ships, suffered numerous issues with its InSurv report.
>
> The Navy took delivery of both the San Antonio and the New Orleans with a significant amount of work left to complete.
>
> About three years ago, the Navy was facing challenges with the construction schedule for LPD-17.
>
> Eventually, the Navy was forced to take delivery of the ship early because they had no money to complete the work, Allison Stiller, deputy assistant secretary of the Navy ships, told *Defense Daily* in a recent interview.
>
> "With LPD-18, we knew we were going to be in a similar situation financially ... that we were going to have to take delivery with a lot less incomplete," she said, although not nearly to the extent of LPD-17.
>
> As the Navy and Northrop Grumman [NOC] Ship Systems began work on the USS Mesa Verde (LPD-19), they began to believe that this ship, too, would have to be delivered incomplete.

[35] Philip Ewing, "InSurv: LPD 18's Ability Degraded," *NavyTimes.com*, August 30, 2008. See also Philip Ewing and Andrew Scutro, "U.S. Navy Inspectors Pan 2nd LPD-17 Ship," *Defense News*, September 1, 2008: 1, 8; "More Issues For LPD Program," *Defense Daily*, September 2, 2008; and Steve Liewer, "Troubles In Port, At Sea Weigh Down Navy Ship," *San Diego Union-Trubune*, October 1, 2008: 1.

> But the combined effort of the shipyard and the Navy helped deliver a completed ship, she added.
>
> LPD-19 wrapped up her shock trials, and the Navy is now compiling the date from the tests, Stiller added.
>
> "We saw what we expected to see. There were no surprises from the shock trial," she said.
>
> The USS Green Bay (LPD-20) was just delivered, and the follow-on ships are looking good, Stiller noted.
>
> Stiller acknowledges there were concerns about delivering finished LPDs. Until the Mesa Verde, Northrop Grumman had not delivered a completed LPD.
>
> "Certainly there are still challenges in getting the ship delivered, but we are in serial production," she said. "The yard is working hard at it. The ships are delivering. [We are] seeing reduced trial cards on everyone of them. That's the trend you want to see. It's good news to get into serial production, no doubt about it."[36]

In October 2008, it was reported that:

> The U.S. Navy's third and fourth San Antonio-class amphibious transport docks show a distinct improvement over the troubled first two ships in the class, inspectors have found. According to reports by the Navy's Board of Inspection and Survey, the third ship, Mesa Verde [LPD-19], was much more complete than its earlier siblings when it was accepted by the Navy Sept. 27, 2007.
>
> And in their report on the fourth ship, Green Bay [LPD-20], inspectors included something never seen before in an inspection report (referred to as an InSurv) about an LPD 17-class ship—a compliment.
>
> "Green Bay was found to be a highly capable and well built ship," they wrote. "The main spaces fit, finish and cleanliness were [satisfactory.]" To be sure, each InSurv still found many problems aboard each ship, and it concluded Mesa Verde was "degraded in its ability to conduct sustained combat operations," as was New Orleans. Overall, however, the two inspections seemed to reinforce statements by the Navy and shipbuilder Northrop Grumman that the San Antonio class is gradually improving after its initial misfires, according to a veteran skipper who examined the documents.
>
> The reports showed that overall build quality on Mesa Verde and Green Bay was much improved over San Antonio and New Orleans, and neither amphib seemed to have experienced as many problems with shipwide networks or electrical systems as the first two.
>
> Neither new ship had major problems with their propulsion systems, as the first two did. Other major problems from the San Antonio and New Orleans—including incomplete berthing spaces, broken gear in the galleys and medical spaces, and nonfunctioning weapons—didn't reoccur in Mesa Verde or Green Bay. Meanwhile, years of work have helped transform San Antonio from one of the Navy's most infamous ships into a fully functional member of the fleet, the ship's captain said.

[36] Geoff Fein, "Navy Seeing Improvements In LHD, LPD-Class Ships, Official Says," *Defense Daily*, September 23, 2008: 1-2. Ellipsis and brackets as in original.

> In a conference call with reporters Oct. 6, Cmdr. Kurt Kastner said San Antonio has had no major problems since it sailed in August from Norfolk as part of the Iwo Jima Expeditionary Strike Group.[37]

In November 2008, it was reported that:

> The troubled amphibious transport dock San Antonio—in the middle of its first deployment—has been forced to undergo two weeks of maintenance in Bahrain due to leaks in its lube oil piping system, Navy officials said.
>
> "They had a scheduled port visit," said Lt. Nate Christensen, spokesman for 5th Fleet in Bahrain. "They're in port for two weeks for a maintenance availability on some lube oil deficiencies. It's related to the diesel generators."
>
> Pat Dolan, a spokeswoman at Naval Sea Systems Command, confirmed that the problem involved leaks in the system.
>
> The yard period began earlier this week, although the exact day was unavailable.[38]

It was also reported in November 2008 that:

> The leaks were discovered while the ship was conducting maritime security operations in the Persian Gulf, according to U.S. Naval Forces Central Command spokesman Lt. Nathan Christensen. The leaky pipes support two of the ship's four main diesel engines, the lieutenant explained. The 684-foot San Antonio was scheduled for a port visit in Bahrain in the middle of this month, but the visit was moved up due to the piping system problem, Christensen noted. The ship has a flexible two-week maintenance period built into its deployment, which is now being used to examine and correct the current problem.
>
> The leaks were first discovered Oct. 9 and a second incident on Oct. 17 prompted the need for a thorough inspection, Lt. Clay Doss, a Navy spokesman at the Pentagon told *ITN* [*Inside the Navy*] Nov. 6.
>
> "We are confident this issue is limited to LPD-17 only," Doss said.
>
> An engineering team from Norfolk, VA, is in Bahrain investigating the situation, he added. The team consists of pipefitters, welders, engineering testing inspectors and other related personnel.[39]

Later in November 2008, it was reported that:

> Experts who have examined the photos of major oil leaks aboard the amphibious transport dock San Antonio are calling the workmanship on the new amphib "sloppy," "unacceptable" and "criminal." One former chief engineer said any other CHENG [Chief of Engineering] in the Navy would be "thankful this wasn't their ship."

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[37] Philip Ewing, "For LPDs, 3rd And 4th Time's The Charm," *Defense News*, October 13, 2008: 3. See also Andrew Scutro, "Photos Show Extent of Oil Leaks on LPD 17," *NavyTimes.com*, November 12, 2008.

[38] Andrew Scutro, "San Antonio Laid Up in Bahrain," *NavyTimes.com*, November 6, 2008.

[39] Zachary M. Peterson, "First-Of-Class LPD-17 Pierside in Bahrain For Unexpected Repairs," *Inside the Navy*, November 10, 2008. See also Mark Thompson, "The Navy's Floating Fiasco," *Time*, November 12, 2008.

But it is someone's ship, and despite the finger-pointing, experts say the Navy has a serious problem on its hands....

"The secretary has been briefed on the issue and has been getting periodic extended updates about the progress of the repairs," said Capt. Beci Brenton, spokeswoman for Navy Secretary Donald Winter.

While the brass is watching and the shipbuilder defends its work and promises to make fixes, one question remains: How was this allowed to happen? And are other problems lurking?

'I'm fuming'

Margaret Mitchell-Jones, spokeswoman for shipbuilder Northrop Grumman, defended the contractor's performance and said the company is taking "corrective actions."

"The quality of our work is something we take very seriously, and we have a rigorous program in place that includes inspecting and evaluating our work to ensure it adheres to the Navy's requirements," she said in a statement. "When issues arise, we aggressively address them in an immediate and methodical way. Upon hearing there may be a problem with lube oil leaks on LPD 17, we immediately responded with technical staff to assist in the Navy's efforts and began our own in-house critique."

She added that "we are proactively conducting a comprehensive review of our procedures, processes and policies surrounding the LPD-class ships currently under construction at our Gulf Coast shipyards. This effort includes the implementation of short-term corrective actions until, aligned with our customer, we fully determine the cause and need for any long-term corrective actions to ensure conformance and reinforce the commitment to quality we have in our work. We have invited and welcomed Navy participation throughout our own internal review process."

On Capitol Hill, lawmakers also are taking notice. Josh Holly, a spokesman for the Republican side of the House Armed Services Committee, said members "continue to follow [San Antonio's] challenges. The seapower subcommittee is aware of the most recent issues, although the Navy has not briefed us yet."

Rep. Joe Sestak, D-Pa., a former vice admiral, said after viewing the photos: "It looks like more of a systemic problem from when it was built."

"The ones who suffer are the bluejackets," said Sestak, a member of the House Armed Services Committee and former top warfare requirements and programs officer for the Navy.

Naval analyst and author Norman Polmar put it more bluntly.

"It's criminal. It's criminal that the Navy accepted this ship," he said. "And this is two and a half years after the Navy accepted the ship. It's bad enough that it was delivered this way."

Polmar said he thinks the San Antonio should be towed back to the shipyard.

"As a taxpayer and as a naval analyst," he said, "I'm fuming."...

Who's to blame?

Those familiar with the situation do not blame the crew or Navy engineers for the problem, comparing it with the discovery of a flaw in your car's chassis during a road trip: You may

have topped off the oil and filled the gas tank before you left, they say, but you can't be expected to examine work completed long ago, when the car was built at the auto plant.

Even those responsible for ensuring the material condition of the fleet—the ultracritical Board of Inspection and Survey—do so under certain assumptions, one Navy source said.

"Even InSurv wouldn't have found faulty welds," the Navy source said.

Cmdr. Jensin Sommer, a spokeswoman for 2nd Fleet, said her command "certifies units for deployment and for integrated training with carrier and expeditionary strike groups so they're ready for integrated operations."

"That's a different type of readiness than material condition," she added.

Pat Dolan, spokeswoman for Naval Sea Systems Command, said naval engineers declined a request to explain the damage because they refused to comment on photos that had not been officially released.

The photos were posted on a blog and later authenticated by Dolan.

She did say that when the ship pulled into Bahrain, it was greeted by a crew of more than 30 engineers, pipefitters and welders flown to Bahrain from the U.S.

As of Nov. 13, there were no initial cost estimates and no available progress reports. "We're still looking at mid- to late November for the repairs to be completed," Dolan said.

She added that engineers are conducting a "root-cause analysis" and the repair and ship crews are fixing the flaws, noting "some that require replacing whole sections of pipe."

Earlier, Dolan said the oil leaks had not posed a danger to sailors working near them.

Other problems lurking?

Naval experts and engineers familiar with the San Antonio's history are concerned that if these welding problems went undiscovered until now, what other problems are waiting to pop up?

Jan van Tol, a retired captain who commanded the amphibious assault ship Essex, said he had deployments during his career commanding three ships that were interrupted by major breakdowns, and that it's not unusual to have technical experts come aboard.

But the size of the repair team and the nature of this casualty is notable, he said.

"It surprises me to see oil leaking from such major points. I associate leaks with moving parts," he said. "What's unusual is the sheer number of people who are going out to address what appears to be a wider-ranging problem."

Van Tol said he thinks any such flaw—if detected—would have prevented the ship's deployment. So how did the ship get as far as it did?

"Are these systemic problems in one or more of the ship's systems and physical plant? If they are, that goes to the question of craftsmanship and why did the Navy accept the ship? Are there ship-wide problems of a similar nature of poor craftsmanship and quality

assurance? Who made the decisions to allow it to reach this point?" he said. "It raises the question of supervision and oversight, both at the shipyard and on the Navy's side."

He won't go as far as other critics, but he did say the situation "certainly doesn't look good."

"It's imperative to take a harsh, harsh look at how they got to this place. The Navy really needs to learn some harsh lessons," he said.

Those lessons may soon be in the syllabus.

Sestak, the former three-star, has called for a hard look at the defense acquisition process since his arrival in Congress in 2007. He believes the problems aboard the San Antonio are a symptom of a larger institutional breakdown among the defense industry, the Pentagon and Congress.

As a former commander in the fleet, he said he finds it hard to believe that the San Antonio could have been allowed to deploy if anyone knew these breakdowns were imminent.

"I expected to be handed machines of war that had a certain level of readiness I then had to maintain. At times there were unexpected problems. Something could break. But I never expected to deploy with a machine of war, particularly a relatively new one, that had systemic problems that would take weeks at a time [to fix]," said Sestak, who commanded the George Washington Carrier Strike Group.

"When it's something that appears systemic to the construction of the machine of war, we're giving short shrift to our warriors out there."

He said operators preparing for deployment care about how the ship and the crew perform; it's not their job to inspect welds. Quality construction is supposed to be a given, something certified long before the ship is ever put into action.

In pre-deployment certifications, "they're not looking inside the welds. They're looking at how it's operating at that moment," he said.

Sestak said the LPD 17 class is just one weapon system among many with major problems.

"I'd like to go back to 'What are the institutional processes that permitted this to happen?' That is where I'd like to go back to the sources and find out how this can be done better," he said. "I have proposed that we should have hearings on acquisition reform in the new session, with LPD 17 part of that."

For Polmar, the naval analyst, the Navy's experience with the San Antonio is a scandal worthy of investigation. He compares it to the infamous Air Force tanker deal that sent an Air Force civilian and an industry executive to jail.

Besides the money and shoddy product, Polmar said putting such a problematic ship to sea put sailors' lives at risk.

"It's as big in some respects as the tanker deal because it's difficult to get to the truth of this," he said. "It's difficult to find out who accepted the ship. People went to jail and were fined in the tanker deal, and that's the minimum of what should happen here."

What's particularly shocking, he said, are the repeated problems in such a new product.

> "We're talking about a warship," he said. "You can see how the oil is leaking through those welds. You may see that on a ship that is 20 or 30 years old, not a ship that's two or three years old."
>
> One naval historian, who asked not to be named because of his affiliations, was asked to think of another surface Navy program this problematic.
>
> "The only thing I'd compare it to are [the littoral combat ship] and DDG 1000," he said. "It just seems like the Navy can't get it right anymore."[40]

It was also reported later in November 2008 that:

> Navy Secretary Donald Winter said Monday [November 17] he "continues to be unsatisfied" with the performance of the amphibious transport dock San Antonio, which has been sidelined by emergency repairs since Oct. 31.
>
> But after a speech in which he described the need for accountability and a "culture of quality" for Navy acquisitions and its private-sector vendors, Winter did not commit to new changes or penalties for problems with the San Antonio and its follow-on siblings.
>
> "I continue to be unsatisfied with the performance there," Winter said. "We are continuing to look at it. It's a matter I'll be spending some time on over the next few weeks. We'll adopt an appropriate course of action ahead."[41]

Still later in November, it was reported that:

> As the Navy continues to examine problems with the lube oil system on the USS San Antonio (LPD-17), the service is taking steps to ensure there are no similar issues with the remainder of the class of amphibious ships.
>
> A team of 30 maintenance personnel from Norfolk Naval Shipyard Mid Atlantic Regional Maintenance Center is in Bahrain, handling the repair work, which is focused on the main propulsion lube oil system, Capt. Bill Galinis, program manager LPD-17, told *Defense Daily* in a recent interview.
>
> Galinis said initial inspections found a couple of issues.
>
> One problem was improperly installed or missing pipe hangers. A second issue were welds that Galinis noted "were on the lower side of the acceptable criteria."
>
> In some cases, those welds didn't pass a visual inspection, he added.
>
> "Those items combined resulted in some cracked welds that we found. We believe it was fatigue failure," he added. "A lot of that analysis is still ongoing."
>
> As of earlier this week, repairs to the San Antonio were 50 percent complete and the work was expected to be wrapped up by mid to late November.

[40] Andrew Scutro, "Gator Oil Leaks: What Went Wrong?" *NavyTimes.com*, November 17, 2008. Bracketed material as in the original. Gator, as in alligator, is an informal term for an amphibious ship.

[41] Philip Ewing, "Winter Remains Unsatisfied With LPD 17," *NavyTimes.com*, November 17, 2008.

The main propulsion lube oil system problem on LPD-17 has led to a class-wide review, a Navy source told *Defense Daily*. That review includes inspection of the weld quality and an examination of whether the number of pipe supports on LPD-18, -19, and -20 are sufficient.

"We are doing engineering analysis and shipboard inspections, the source said "That includes visual, radiological and dye penetration."

The lube oil leaks occurred in the forward and aft machinery space, the source said.

The inspections take place in two groups, one focusing on the welds and the other on the pipe hangers, Galinis said.

Weld inspections in one of two machinery rooms have been completed on LPD-18, Galinis added.

The results of that inspection show the welds are good, he noted.

"The ship is underway right now. When she pulls back in here ... we'll do the second machinery room," Galinis said. "We also just completed the pipe hanger inspection, so we have a list of pipe hangers we need to add."

The pipe hanger work likely will get done before LPD-18's deployment next year, he added.

The inspections are not limited to the ships, however. Galinis added the Navy is also looking at the weld inspection techniques used in the shipyards. "We are doing that from a training aspect, looking at the weld criteria that is applied when you do a visual inspection ... how that's applied to ensure there is uniformity."

"[We are] also taking an opportunity to go back and look at the processes that are in place in the shipyard, all the way from how the pipe is fabricated in the pipe shop and weld joints that are installed, and how the welding is done, to installation on the ship and the way the pipe gets 'hangered' on the ship," Galinis said.

"If you follow that trend all the way, from material receipt, through the fabrication of pipe details, to the installation of the pipe on the ship, to the testing of the pipe and inspection of the welds and the installation of the system, if you follow that process all the way through, there are things along the way here that we certainly can improve on," he added. "And we are taking that opportunity to do this."

Northrop Grumman [NOC] Ship Systems said the quality of its work is something the company takes very seriously.

"We have a rigorous program in place that includes inspecting and evaluating our work to ensure it adheres to the Navy's requirements. When issues arise, we aggressively address them in an immediate and methodical way," Margaret Mitchell-Jones, a Northrop Grumman Shipbuilding spokeswoman, told *Defense Daily*. "Upon hearing there may be a problem with lube oil leaks on LPD-17, we immediately responded with technical staff to assist in the Navy's efforts and began our own in-house critique. We have put our best people in place to assist our customer and we are proactively conducting a comprehensive review of our procedures, processes and policies surrounding the LPD-class ships currently under construction at our Gulf Coast shipyards."

Those efforts include the implementation of short-term corrective actions until, aligned with the Navy, Northrop Grumman determines the cause and need for any long-term corrective

> actions to ensure conformance and reinforce the commitment to quality the company has in its work, Mitchell-Jones added.
>
> "We have invited and welcomed Navy participation throughout our own internal review process."
>
> Northrop Grumman builds the San Antonio-class amphibious ships at both its Pascagoula, Miss., and New Orleans shipyards.
>
> The fourth ship of the class, LPD-20, was just delivered, Galinis said.
>
> LPD-21 through -25 are under construction, with LPD-22 and -24 being built at Pascagoula and LPD-21, -23, and -25 being built in New Orleans.
>
> The Navy just received funding for LPD-26 in the FY '09 defense bill. "We are in the process of putting together the RFP documents," Galinis said.
>
> Lessons learned from the lube oil leak on LPD-17 have been rolled into LDP-21, he added.
>
> Currently, LPD-21 is about to begin the process where its lube oil system is flushed, Galinis said.
>
> "Obviously lessons learned from [LPD]-17 were immediately applied to [LPD]-21 because that piping system, although it is installed and fully built, hasn't been completed with all the ... insulation, so it was very easy to take what we were seeing on [LPD]-17 and go back and look at [LPD]-21 ... look at the welds, look at where the pipe hangers are ... and in some cases, quite frankly even now, not all the pipe hangers are installed. So we are kind of still in that process."
>
> For the ships that have already been delivered, Galinis said there is a big focus on LPD-18, which is out on the West Coast and will deploy next year. LPD-19 is currently going through her (Post Shakedown Availability PSA) in Norfolk, Va., at BAE Systems. "We will do a weld and hanger inspection on her during the current PSA period she is in," Galinis said.
>
> The Navy is doing an inspection right now on LPD-20. Earlier this month, she was going through an engineering certification with her crew, Galinis said. "We didn't want to get into the machinery spaces while she was going through that inspection."
>
> That certification wrapped up last week, so the Navy is now going through the inspection on her, he added. "So far the results look pretty good, but we are still in that process."[42]

It was subsequently reported in November that:

> While it might appear that the Navy's San Antonio-class program is fraught with problems, the Navy and industry team have been able to drastically reduce the number of inspection trial cards and put in place construction practices to cut down on installation work and on cost, according to a Navy official.

[42] Geoff Fein, "Navy Making Sure LPD-17 Lube Oil Leak Problem Doesn't Spread To Rest of Class," *Defense Daily*, November 20, 2008: 1-3. Ellipses and material in brackets as in the original.

When the USS San Antonio (LPD-17) wrapped up her trials, the Navy's Board of Inspection and Survey (INSURV) wrote up just over 16,000 trial cards, Capt. Bill Galinis, LPD-17 program manager, told *Defense Daily* in a recent interview.

In April 2007, LPD-17 went into BAE Systems' repair facility in Norfolk, Va., to fix the problems found by the inspection.

The cost of Post Shakedown Authority (PSA) for the USS San Antonio was $36 million....

When the USS New Orleans (LPD-18) finished her trials earlier this year, the INSURV board wrote up just under 14,000 trial cards, Galinis noted.

"When we delivered the ships, they were not quite finished," he said of both the San Antonio and New Orleans.

"When we got to [LPD]-19, that's where we saw the big down shift. We had a little bit more than a 50 percent reduction from hull 2 to hull 3, and that was a step increase for us," Galinis said. "Same thing on Part 1 cards, where you went from 740 cards to 257 ... better than a 50 percent decrease from the second to third ship."

Part 1 cards note deficiencies that would affect a mission area of the ship, such as defensive systems, the ability to get underway and embark Marines, Galinis said.

Part 2 cards are material deficiencies that would not necessarily degrade a mission area, he added.

By the time the USS Mesa Verde (LPD-20) underwent her INSURV inspection, the amount of Part 1 cards decreased almost 90 percent, Galinis said.

"That's a real credit to the builder and the Navy team that's down there on site, where literally we go through and prepare a ship to go through the trial process," Galinis said.

The first trial is conducted by the Navy's Supervisor of Ships (SUPSHIP). Galinis said they take the INSURV reports from the previous inspections and start from there.

"As we go through the test sequence, we are looking at these deficiencies and making sure we are rolling those lessons in," he said. "The shipyard has a process where they do that, and the SUPSHIP does that as well."

But it's difficult to roll in those lessons learned. That's because two different yards are building the LPD-17 class: Northrop Grumman [NOC] Ship Systems Pascagoula, Miss., facility and the company's shipyard in New Orleans.

"Across the class, you don't get true learning because we are building ships in alternate facilities," Galinis said. "Although there is some part of the workforce that moves back and forth across the two shipyards."

Another issue has been that the lessons learned from LPD-17 and -18 have been rolled into the follow-on ships out of sequence, Galinis said.

"On [LPD]-19 and -20, a lot of these lessons learned were cut in... out of sequence. In other words, if you had to plan how you do the work, some of the changes as a result of some of these earlier INSURV trials were rolled into these follow ships probably not at the optimum time, if you had an opportunity to really plan it out," he said. "That's because if you take a

look at how the ships stack up on top of one another, they were just that close in the construction sequence."

Not being able to cut that work in, in sequence, affects not only the number of changes that can be cut in but also what it cost to do that work, Galinis added.

That also affects the end cost of this ship in some cases because it takes more man hours to do that. Galinis said it is the three, two, one rule.

"What would take you an hour to do in a unit would take you two hours to do when you stack that on, and when the ship goes into the water that task would take you three hours to do," he said. "So you can see as a ship gets closer to delivery it gets more expensive to do the same amount of work, because you close the ship down and are working in a much more confined space ... and it's more difficult to do the work.

"That's why when I say we are cutting corrections in, out of sequence here, you don't generally get as much learning and the same leverage," Galinis added.

What people will start to see on the USS New York (LPD-21) and the follow ships, however, is that a lot of this work is being done in sequence, Galinis said. "So we are able to sort of pan that in, and certainly with [LPD-] 22 and follow-on you will see even more of that."

The other thing the Navy and Northrop Grumman have been able to do on these ships is to increase the amount of pre-outfit on the units, Galinis said.

There are 210 units on a LPD-17-class ship. Those units are built in modules. What the Navy would like to try to do is get as much pre-outfitting done as they possibly can.

"By installing piping systems, equipment, some machinery units, ventilation, electrical components, things of that nature ... on the earlier ships pre-outfitting has probably been in the 70 percent range. We are moving up into the 90 percent, or even better, on these later ships," Galinis said. "Going back to that three-two-one rule, we are doing a lot more of that work on the front end of the construction process at a lower cost. As we start to stack those units, there is less installation work to do on the back end.

"The lessons learned in the items that were identified on the previous ships, that work is being done more efficiently, in sequence on [LPD-] 21 and follow, and we are also able, on [LPD-] 22 and follow, to pull that back further and include that as part of the pre-outfitting work that we do. We are increasing that amount of work as well."[43]

A November 2008 press report stated:

Pentagon acquisition czar John Young last week criticized the welds on the Northrop Grumman-built San Antonio (LPD-17), but said it remains to be seen if current problems with the ship lie with the builder or with the Navy.

The first-of-class amphibious transport dock ship San Antonio hit a snag recently during its much-anticipated first deployment. The ship is pierside in Manama, Bahrain, where leaks in the lube oil piping system are being investigated and ultimately repaired. "All the vessels of the class are being reinspected," Young said in a Nov. 20 breakfast meeting with reporters in

[43] Geoff Fein, "Lessons Learned From INSURV Inspections Lead To Improvements On San Antonio-Class," *Defense Daily*, November 21, 2008: 3-5. Ellipses and bracketed material as in the original.

Washington. “I think the Navy is doing the prudent thing to go back and look through the class.”

Yet, Allison Stiller, the deputy assistant secretary of the Navy for shipbuilding, told Inside the Navy Nov. 12 that the service believes the problems with the San Antonio are exclusive to that ship.

“Right now the issues that we’re experiencing on the lead ship [LPD-17], we believe are isolated to the lead ship,” Stiller said in an interview in her Pentagon office.

“We’re still getting the data, but the indications are this is limited to the lead ship and, again, it’s pipe hangers, welds or a combination, and we have to come through that analysis to understand what the problem is,” she added.

Young noted last week that the investigation is not complete and he does yet know the extent of the lube oil piping system problem.

“In the lube oil area, the Navy is still doing an investigation,” he said. “The initial results of this are somewhat concerning, and that is both industry and the Navy may have inspected these welds to a lesser standard than the Navy called for.”

Moreover, the acquisition chief argued Northrop Grumman, the shipbuilder, had higher-than-normal defect rates on some of the ship’s welds, which could in turn have led to the current problems.

“In the past, the company had defect rates over 30 percent or higher on high-temperature, high-pressure welding and even on rather simple drain pipe welding,” Young said. “None of those are the lube oil system, which I don’t know if we had excessive defect rates there.”

If the leaks are found to be the result of inadequate inspections by industry, and in turn, the Navy, the taxpayer should not foot the bill, Young argued.

“The government should not be paying under cost-plus contracts, in any area of product delivery, for poor standard of performance where we have to pay extra cost to have it re-done,” he said. “I think the defect rates on some of those high-temperature, high-pressure welds, drain-pipe welds were excessive and the government needs to find a different way to do business with industry in any sector where we get something that’s totally anomalous to what would be reasonable commercial practice.”

Northrop has launched its own investigation into the problem, the company’s president of shipbuilding told ITN [Inside the Navy] last week.

“When we first heard of the specific set of issues on LPD-17, we immediately set up our own investigation, our own team, to try to understand what are the issues to the best of our ability to figure out. What are our processes, where are the gaps in our processes, do we have them, have we already addressed them?” Mike Petters said in a Nov. 17 interview in Newport News, VA.

“We have worked cooperatively with the Navy, and we’re providing whatever assistance they’re asking for,” he added. “I don’t think we’re actually doing any of the repairs ourselves. We have had people there to assist in some of the fact finding and to help diagnose what’s going on.”

The shipyard is "conducting briefings and reviews throughout all Gulf Coast facilities of Northrop Grumman Shipbuilding to include all quality inspectors, pipewelders, and pipefitters," a company spokeswoman said Nov. 20.

Moreover, Northrop is taking other measures to ensure its processes are working right, including:

—Performing a comprehensive review of all documentation from LPD-17, focusing specifically on pipe and weld design, quality inspection requirements and procedures as well as procedural compliance to design specifications;

—inspecting the piping system to verify the necessary support hangers have been installed; and

—performing inspections—in conjunction with the Navy—of the pipe systems on LPD-20 to ensure all weld standards are compliant before the ship leaves the yard in New Orleans.[44]

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[44] Zachary M. Peterson (with additional reporting by Rebekah Gordon), Young: Navy Should Not Pay For Poor Craftsmanship On LPD-17 Ships," *Inside the Navy*, November 24, 2008.