Navy Littoral Combat Ship (LCS) Program: Background, Issues, and Options for Congress

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Summary

The Littoral Combat Ship (LCS) is a relatively inexpensive Navy surface combatant that is to be equipped with modular "plug-and-fight" mission packages. The basic version of the LCS, without any mission packages, is referred to as the LCS sea frame. The Navy wants to procure a total of 55 LCSs.

There are currently two LCS designs—one designed and produced by an industry team led by Lockheed, and one designed and produced by an industry team led by General Dynamics. The first ship in the program—LCS-1, funded in FY2005 and built to the Lockheed design—was commissioned into service on November 8, 2008. The second ship in the program—LCS-2, funded in FY2006 and built to the General Dynamics design—was delivered to the Navy on December 18, 2009, and is scheduled to be commissioned into service on January 16, 2010. LCS-3 (being built to the Lockheed design) and LCS-4 (being built to the General Dynamics design) were funded in FY2009 at a combined cost of $1,020 million and are under construction.

The Navy's proposed FY2010 budget, submitted in May 2009, requested $1,380 million for the procurement of three more LCSs—an average of $460 million per ship, which at the time was the unit procurement cost cap for LCSs procured in FY2010 and subsequent years.

On September 16, 2009, the Navy announced a proposed new strategy for acquiring LCSs procured in FY2010 and subsequent years. Under the Navy's proposed strategy, the Navy would reduce the number of LCSs to be procured in FY2010 from three to two, and would hold a price-based competition to pick a single design to which all LCSs procured in FY2010 and subsequent years would be built. (The process of selecting the single design for all future production is called a down select.) The winner of the down select would be awarded a contract to build 10 LCSs over the five-year period FY2010-FY2014, at a rate of two ships per year. The Navy would then hold a second competition—open to all bidders other than the shipyard building the 10 LCSs in FY2010-FY2014—to select a second shipyard to build up to five additional LCSs to the same design in FY2012-FY2014 (one ship in FY2012, and two ships per year in FY2013-FY2014). These two shipyards would then compete for contracts to build LCSs procured in FY2015 and subsequent years.

FY2010 defense authorization act (H.R. 2647/P.L. 111-84: The conference report (H.Rept. 111-288 of October 7, 2009) on H.R. 2647 contains three provisions relating directly to the LCS program: Section 121 provides the Navy the contracting authority to implement the LCS acquisition strategy that the Navy announced on September 16, 2009, and amends the LCS unit procurement cost cap to $480 million per ship, with provisions for adjusting that figure over time to take inflation and other events into account. Section 122 requires the LCS program to be treated as a major defense acquisition program (MDAP) for purposes of program management and oversight. Section 123 requires a report on the Navy's plan for homeporting LCSs.

FY2010 Department of Defense appropriations act (H.R. 3326/P.L. 111-118): The explanatory statement for H.R. 3326/P.L. 111-118 provides $1,080 million for the procurement of two LCSs, or an average of $540 million per ship. The explanatory statement states that a rescission of $84.8 million in FY2009 Other Procurement, Navy (OPN) funding that is made by Section 8042 of the act includes a rescission of $66 million for LCS mission modules.

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Introduction

The Littoral Combat Ship (LCS) is a relatively inexpensive Navy surface combatant that is to be equipped with modular "plug-and-fight" mission packages. The basic version of the LCS, without any mission packages, is referred to as the LCS sea frame. The Navy wants to procure a total of 55 LCSs. The Navy's planned force of 55 LCSs accounts for about 18% of its planned fleet of 313 ships of all types.[1]

The Navy substantially restructured the LCS program in 2007 in response to significant cost growth and construction delays in the program.

There are currently two LCS designs—one designed and produced by an industry team led by Lockheed, and one designed and produced by an industry team led by General Dynamics. The first ship in the program—LCS-1, funded in FY2005 and built to the Lockheed design—was commissioned into service on November 8, 2008. The second ship in the program—LCS-2, funded in FY2006 and built to the General Dynamics design—was delivered to the Navy on December 18, 2009, and is scheduled to be commissioned into service on January 16, 2010.[2] LCS-3 (being built to the Lockheed design) and LCS-4 (being built to the General Dynamics design) were funded in FY2009 at a combined cost of $1,020 million and are under construction.

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The Navy's proposed acquisition strategy poses several potential oversight questions for Congress, including whether the timing of the Navy's proposal provides Congress with sufficient time to adequately review the proposal prior to finalizing its action on the FY2010 defense budget.

The issue for Congress is whether to approve, reject, or modify the Navy's plans for the LCS program, including the number of LCSs to procured in FY2010 and the Navy's newly proposed

[1] For more on the Navy's planned 313-ship fleet, see CRS Report RL32665, *Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress*, by Ronald O'Rourke.

[2] See, for example, Christopher P. Cavas, "2nd LCS delivered to Navy," *NavyTimes.com*, December 20, 2009.

strategy for acquiring LCSs procured in FY2010 and subsequent years. Decisions that Congress makes on this issue could affect future Navy capabilities and funding requirements, and the shipbuilding industrial base.

Background

The LCS in General

Ship Missions and Design

The LCS program was announced on November 1, 2001.[3] The LCS is a relatively inexpensive Navy surface combatant that is to be equipped with modular "plug-and-fight" mission packages, including unmanned vehicles (UVs). Rather than being a multimission ship like the Navy's larger surface combatants, the LCS is to be a focused-mission ship equipped to perform one primary mission at any one time. The ship's mission orientation is to be changed by changing out its mission packages. The basic version of the LCS, without any mission packages, is referred to as the LCS sea frame.

The LCS's primary intended missions are antisubmarine warfare (ASW), mine countermeasures (MCM), and surface warfare (SUW) against small boats (including so-called "swarm boats"), particularly in littoral (i.e., near-shore) waters. The LCS program includes the development and procurement of ASW, MCM, and SUW mission packages for LCS sea frames. Additional missions for the LCS include intelligence, surveillance, and reconnaissance (ISR), maritime intercept operations, support of special operations forces, and homeland defense.

The LCS displaces about 3,000 tons, making it about the size of a corvette (i.e., a light frigate) or a Coast Guard cutter. It has a maximum speed of more than 40 knots, compared to something more than 30 knots for the Navy cruisers and destroyers. The LCS has a shallower draft than the Navy cruisers and destroyers, permitting it to operate in certain coastal waters and visit certain ports that are not accessible to Navy cruisers and destroyers. The LCS employs automation to achieve a reduced "core" crew of 40 sailors. Up to 35 or so additional sailors are to operate the ship's embarked aircraft and mission packages, making for a total crew of about 75, compared to more than 200 for the Navy's frigates and about 300 (or more) for the Navy's current cruisers and destroyers.

[3] On November 1, 2001, the Navy announced that it was launching a Future Surface Combatant Program aimed at acquiring a family of next-generation surface combatants. This new family of surface combatants, the Navy stated, would include three new classes of ships: a destroyer called the DD(X)—later redesignated the DDG-1000—for the precision long-range strike and naval gunfire mission; a cruiser called the CG(X) for the air defense and ballistic missile mission, and a smaller combatant called the Littoral Combat Ship (LCS) to counter submarines, small surface attack craft, and mines in heavily contested littoral (near-shore) areas. For more on the DDG-1000 program, see CRS Report RL32109, *Navy DDG-51 and DDG-1000 Destroyer Programs: Background and Issues for Congress*, by Ronald O'Rourke. For more on the CG(X) program, see CRS Report RL34179, *Navy CG(X) Cruiser Program: Background, Oversight Issues, and Options for Congress*, by Ronald O'Rourke.

Two Industry Teams, Each With Its Own Design

On May 27, 2004, the Navy awarded contracts to two industry teams—one led by Lockheed Martin, the other by General Dynamics (GD)—to design two versions of the LCS, with options for each team to build up to two LCSs each. The two teams' LCS designs are quite different—Lockheed's design is based on a semi-planing steel monohull, while GD's design in based on an aluminum trimaran hull. The two ships also use different combat systems (i.e., different collections of built-in sensors, computers, software, and tactical displays) that were designed by each industry team. The Lockheed team was assigned LCS-1 and (the subsequently canceled) LCS-3, while the GD team was assigned LCS-2 and (the subsequently canceled) LCS-4. (The designations LCS-3 and LCS-4 are now being reused by the Navy to refer to two other LCSs—the two LCSs funded in FY2009. The LCS-3 and LCS-4 that were funded in FY2009 are not the same ships as the LCS-3 and LCS-4 that the Navy cancelled.[4]) Lockheed announced plans to build its LCSs at Marinette Marine of Marinette, WI, and Bollinger Shipyards of Lockport, LA, with LCS-1 being built by Marinette and LCS-3 to have been built by Bollinger. GD announced plans to build its LCSs at the Austal USA shipyard of Mobile, AL.[5]

Planned Procurement Quantities and Program Funding

The Navy plans to procure a total of 55 LCS sea frames and 64 LCS mission packages (16 ASW, 24 MCM, and 24 SUW). Earlier Navy plans anticipated procuring between 90 and 110 mission packages for a 55-ship fleet.

The Administration's proposed FY2010 defense budget, which was submitted to Congress in early May, was not accompanied by a Future Years Defense Plan (FYDP) for the period FY2010-FY2015 or a 30-year Navy shipbuilding plan for the period FY2010-FY2039. The Administration's FY2010 budget submission consequently does not include information on planned annual LCS procurement quantities for fiscal years after FY2010. Navy budget submissions for previous years have showed the annual LCS procurement rate increasing over time to a sustained rate of five or six ships per year. As discussed below, however, the proposed new acquisition strategy for LCSs announced by the Navy on September 16, 2009, appears to contemplate building no more than four LCSs per year.

Table 1 shows LCS acquisition (i.e., research and development plus procurement) funding for FY2007 through FY2010. The figures in the table reflect reprogramming of prior-year program funding undertaken as part of the Navy's 2007 restructuring of the LCS program. In addition to the funding shown in the table, the LCS program also received about $1.7 billion in acquisition funding between FY2003 and FY2006.

[4] For details, see **Table B-1**.

[5] Austal USA was created in 1999 as a joint venture between Austal Limited of Henderson, Western Australia and Bender Shipbuilding & Repair Company of Mobile, AL. The GD LCS team also includes GD/BIW as prime contractor to provide program management and planning, provide technical management, and to serve as "LCS system production lead."

Table 1. LCS Program Acquisition Funding, FY2007-FY2013

(millions of dollars; figures rounded to nearest million)

Budget account[a]	FY07	FY08	FY09	FY10
RDT&EN	664	309	368	361
SCN	93	0[b]	1017	1380
APN	37	37	50	78
WPN	0	0	3	0
OPN	79	0	74	137
TOTAL	**873**	**347**	**1511**	**1955**

Source: Navy FY2010 budget submission and (for FY2007) FY2009 budget submission. Figures may not add due to rounding. The program also received about $1.7 billion in acquisition funding between FY2003 and FY2006.

a. RDT&EN = Research, Development, Test, and Evaluation, Navy account; SCN = Shipbuilding and Conversion, Navy account; APN = Aircraft Procurement, Navy account; WPN = Weapons Procurement, Navy account; OPN = Other Procurement, Navy account.

b. $337 million in FY2008 SCN funding was rescinded by Congress as part of its action on the FY2009 budget.

With Congress's permission, the Navy procured the first and second LCSs through the Navy's research and development account. Subsequent LCSs are being procured in the traditional manner, through the Navy's ship-procurement account, called the Shipbuilding and Conversion, Navy (SCN) account. The Navy is procuring LCS mission packages through the Other Procurement, Navy (OPN) account.

Unit Procurement Cost Cap

LCS sea frames procured in FY2010 and subsequent years are subject to a unit procurement cost cap. The legislative history of the cost cap is as follows:

- The cost cap was originally established by **Section 124 of the FY2006 defense authorization act** (H.R. 1815/P.L. 109-163 of January 6, 2006). Under this provision, the fifth and sixth ships in the class were to cost no more than $220 million each, plus adjustments for inflation and other factors.
- The cost cap was amended by **Section 125 of the FY2008 defense authorization act** (H.R. 4986/P.L. 110-181 of January 28, 2008). This provision amended the cost cap to $460 million per ship, with no adjustments for inflation, and applied the cap to all LCSs procured in FY2008 and subsequent years.
- The cost cap was amended again by **Section 122 of the FY2009 defense authorization act** (S. 3001/P.L. 110-417 of October 14, 2008). This provision deferred the implementation of the cost cap by two years, applying it to all LCSs procured in FY2010 and subsequent years.
- The cost cap was amended again by **Section 121 of the FY2010 defense authorization act** (H.R. 2647/P.L. 111-84 of October 28, 2009). The provision adjusted the cost cap to $480 million per ship, and included provisions for adjusting that figure over time to take inflation and other events into account.

Total Acquisition Cost

The Navy has not provided an estimated total acquisition (i.e., development plus procurement) cost for the LCS program. CRS estimates that the LCS program (including mission packages) might have a total acquisition cost of roughly $29.4 billion. This estimate includes $2.5 billion in research and development costs (including the construction of first two LCS sea frames and the procurement of the first four mission packages), procurement of 53 additional LCS sea frames at a cost of $460 million each, and procurement of 60 additional mission packages procured at an average cost of about $42.3 million each.[6] This estimate does not include costs for LCS-related aircraft procurement or weapon procurement, such as those shown in the APN and WPN rows of **Table 1**.

Cost Growth on LCS Sea Frames

The Navy originally spoke of building LCS sea frames for about $220 million each in constant FY2005 dollars. Estimated LCS sea frame procurement costs have since grown substantially above that figure. The estimate for LCS-1 has grown from $215.5 million in the FY2005 budget to $537 million in the FY2010 budget. The estimate for LCS-2 has grown from $213.7 million in the FY2005 budget to $575 million in the FY2010 budget. Subsequent LCSs are expected to cost less than LCS-1 and LCS-2.

The figures of $537 million and $575 million in the previous paragraph are end-cost figures. End cost is the figure often reported as the total procurement cost of a Navy ship. It is a fairly comprehensive figure for a ship's procurement cost, but it does exclude certain cost elements. The FY2010 budget submission states that when additional costs for outfitting and post delivery (OF/PD) and for "final system design/mission systems and ship integration team" (FSD/MSSIT) are included, the total estimated procurement costs of LCS-1 and LCS-2 become $637 million and $704 million, respectively.

The Navy stated in 2008 that although FSD/MSSIT costs are shown in budget-justification documents as part of the total estimated procurement costs of LCS-1 and LCS-2, the work in question is normally funded from a shipbuilding program's general research and development funds, rather than from funds used to pay for the construction of individual ships in the program. The Navy stated that in the case of the LCS program, these costs are shown as part of the total procurement costs of LCS-1 and LCS-2 because this is where there was room in the LCS program's line-item funding breakdown to accommodate these costs.[7] Removing these costs from the total procurement costs of LCS-1 and LCS-2 would lead to adjusted total procurement costs of $612 million and $650 million, respectively, for the two ships.

For a detailed discussion of cost growth on LCS sea frames, see **Appendix A**.

[6] The Navy reportedly wants to procure 24 mine warfare mission packages at an average cost of $68 million each, 16 antisubmarine warfare packages at an average cost of $42.3 million each, and 24 surface warfare packages at an average cost of $16.7 million each. (Emelie Rutherford, Littoral Combat Ship Mission Packages Range In Costs, Features," *Inside the Navy*, September 3, 2007; for similar figures, see Christopher P. Cavas, "First LCS Mission Package Ready For Delivery," *DefenseNews.com*, August 29, 2007.)

[7] Source: Navy briefing to CRS and CBO on the LCS program, May 2, 2008.

Acquisition Strategy

2007 Program Restructuring and Ship Cancellations

The Navy substantially restructured the LCS program in 2007 in response to significant cost growth and delays in constructing the first LCS sea frames. This restructuring led to the cancellation of four LCSs that were funded in FY2006 and FY2007. A fifth LCS, funded in FY2008, was cancelled in 2008. For details on the 2007 program restructuring and the cancellation of the five LCSs funded in FY2006-FY2008, see **Appendix B**.

Acquisition Strategy for FY2009 and FY2010 Ships Prior to September 16, 2009

Prior to the Navy's announcement of September 16, 2009, the Navy had announced an acquisition strategy for LCSs to be procured in FY2009 and FY2010. Under this acquisition strategy, the Navy bundled together the two LCSs funded in FY2009 (LCSs 3 and 4) with the three LCSs to be requested for FY2010 into a single, five-ship solicitation. The Navy announced that each LCS industry team would be awarded a contract for one of the FY2009 ships, and that the prices that the two teams bid for both the FY2009 ships and the FY2010 ships would determine the allocation of the three FY2010 ships, with the winning team getting two of the FY2010 ships and the other team getting one FY2010 ship. This strategy was intended to use the carrot of the third FY2010 ship to generate bidding pressure on the two industry teams for both the FY2009 ships and the FY2010 ships.

The Navy stated that the contracts for the two FY2009 ships would be awarded by the end of January 2009. The first contract (for Lockheed Martin, to build LCS-3) was awarded March 23, 2009; the second contract (for General Dynamics, to build LCS-4) was awarded May 1, 2009. The delay in the awarding of the contracts past the end-of-January target date may have been due in part to the challenge the Navy faced in coming to agreement with the industry teams on prices for the two FY2009 ships that would permit the three FY2010 ships to be built within the $460 million LCS unit procurement cost cap.[8]

[8] At a March 10, 2009, hearing on the LCS program, the Navy stated the following regarding the acquisition strategy for LCSs procured in FY2009 and FY2010:

> In October 2008, the Undersecretary of Defense for Acquisition, Technology and Logistics (USD(AT&L)) approved a revised acquisition strategy for LCS to cover procurement of the FY 2009 and FY 2010 ships. The updated acquisition strategy combines the FY 2009 procurement and FY 2010 options in order to maximize competitive pressure on pricing as a key element of cost control. Increasing the quantity solicited by adding the FY 2010 ships to the FY 2009 solicitation as options will also enable industry to better establish longer term supplier relationships and offer the potential for discounting to the prime contractors and subcontractors. FY 2010 ship options will be a competition for quantity....
>
> As a result of congressional direction contained in the FY 2009 Defense Appropriations Act, the Navy amended the LCS seaframe construction solicitation to delete the FY 2008 ship. This amended solicitation continues the competition between the two incumbent industry teams. The Navy may award one ship to each industry team in FY 2009 and intends to hold a competition for the FY 2010 option ships soon after award of the FY 2009 contracts. Affordability remains a key tenet of the LCS program as the Navy works with industry to provide this capability for the lowest cost.
>
> The FY 2009 and FY 2010 awards will be fixed-price incentive contracts, with the Navy anticipating that each LCS prime contractor receives one ship in FY 2009. The Navy remains

(continued...)

Proposed Acquisition Strategy Announced on September 16, 2009

On September 16, 2009, the Navy announced a proposed new strategy for acquiring LCSs procured in FY2010 and subsequent years. Under the Navy's proposed strategy, the Navy would reduce the number of LCSs to be procured in FY2010 from three to two, and would hold a price-based competition to pick a single design to which all LCSs procured in FY2010 and subsequent years would be built. (The process of selecting the single design for all future production is called a down select.) The winner of the down select would be awarded a contract to build 10 LCSs over the five-year period FY2010-FY2014, at a rate of two ships per year. The Navy would then hold a second competition—open to all bidders other than the shipyard building the 10 LCSs in FY2010-FY2014—to select a second shipyard to build up to five additional LCSs to the same design in FY2012-FY2014 (one ship in FY2012, and two ships per year in FY2013-FY2014). These two shipyards would then compete for contracts to build LCSs procured in FY2015 and subsequent years.

A September 16, 2009, Department of Defense (DOD) news release on the proposal stated:

> The Navy announced today it will down select between the two Littoral Combat Ship (LCS) designs in fiscal 2010. The current LCS seaframe construction solicitation [for the FY2010 LCSs] will be cancelled and a new solicitation will be issued. At down select, a single prime contractor and shipyard will be awarded a fixed price incentive contract for up to 10 ships with two ships in fiscal 2010 and options through fiscal 2014. This decision was reached after careful review of the fiscal 2010 industry bids, consideration of total program costs, and ongoing discussions with Congress.
>
> "This change to increase competition is required so we can build the LCS at an affordable price," said Ray Mabus, secretary of the Navy. "LCS is vital to our Navy's future. It must succeed."
>
> "Both ships meet our operational requirements and we need LCS now to meet the warfighters' needs," said Adm. Gary Roughead, chief of naval operations. "Down selecting

(...continued)

> committed to effective cost control and has modified contracting strategies and management practices to provide program stability. The FY 2009 and FY 2010 ships will be designated as Flight 0+ and will include only existing approved engineering changes along with improvements to construction or fabrication procedures. The Navy will incorporate further lessons learned from LCS 1 and 2 sea trials into the FY 2009 and FY 2010 ships prior to production. Any such changes will be limited to those essential for safety, operability or affordability. Furthermore, the RFP requests that the proposals for the FY 2010 option ships include alternative prices for both a full-up ship and separately priced contract line item numbers (CLINs) for a core seaframe (only systems for safe operation at sea), core combat system and individual combat systems and equipments (such as the gun or radar). This allows us the opportunity to manage the integration of the combat systems separately if that proved to be more affordable.
>
> In the interim prior to FY 2009 contract awards, both industry teams were authorized and funded to pursue limited design and construction efforts while source selection proceeded. The scope of these efforts was carefully coordinated with prime contractors with an eye on preserving critical shipbuilding skills or to improve production process engineering. Once the FY 2009 ships are awarded, these sustaining efforts will be subsumed in the shipbuilding contracts

(Statement of RADM Victor Guillory, U.S. Navy Director of Surface Warfare, and RADM William E. Landay, III, Program Executive Officer Ships, and Ms. E. Anne Sandel, Program Executive Officer Littoral and Mine Warfare, before the Subcommittee on Seapower and Expeditionary Forces of the House Armed Services Committee [hearing] on the Current Status of the Littoral Combat Ship Program, March 10, 2009, pp. 7-8.)

> now will improve affordability and will allow us to build LCS at a realistic cost and not compromise critical warfighting capabilities."
>
> The Navy cancelled the solicitation to procure up to three LCS Flight 0+ ships in fiscal 2010 due to affordability. Based on proposals received this summer, it was not possible to execute the LCS program under the current acquisition strategy and given the expectation of constrained budgets. The new LCS acquisition strategy improves affordability by competitively awarding a larger number of ships across several years to one source. The Navy will accomplish this goal by issuing a new fixed price incentive solicitation for a down select to one of the two designs beginning in fiscal 2010.
>
> Both industry teams will have the opportunity to submit proposals for the fiscal 2010 ships under the new solicitation. The selected industry team will deliver a quality technical data package, allowing the Navy to open competition for a second source for the selected design beginning in fiscal 2012. The winner of the down select will be awarded a contract for up to 10 ships from fiscal 2010 through fiscal 2014, and also provide combat systems for up to five additional ships provided by a second source. Delivery of LCS 2, along with construction of LCS 3 and LCS 4 will not be affected by the decision. This plan ensures the best value for the Navy, continues to fill critical warfighting gaps, reduces program ownership costs, and meets the spirit and intent of the Weapons System Acquisition Reform Act of 2009....
>
> The Navy remains committed to the LCS program and the requirement for 55 of these ships to provide combatant commanders with the capability to defeat anti-access threats in the littorals, including fast surface craft, quiet submarines and various types of mines. The Navy's acquisition strategy will be guided by cost and performance of the respective designs as well as options for sustaining competition throughout the life of the program.[9]

A September 16, 2009, e-mail from the Navy to CRS provided additional information on the proposed new strategy, stating:

> The Navy remains committed to a 55 ship LCS program and intends to procure these ships through an acquisition strategy that leverages competition, fixed price contracting and stability in order to meet our overarching objectives of performance and affordability.
>
> In the best interest of the Government, the Navy cancelled the solicitation to procure up to three LCS Flight 0+ ships in FY10 due to affordability.
>
> Based on proposals received in August, the Navy had no reasonable basis to find that the LCS Program would be executable going forward under the current acquisition strategy, given the expectation of constrained budgets.
>
> In the near future, and working closely with Congress, the Navy will issue a new FY10 solicitation which downselects between the two existing designs and calls for building two ships in FY10 and provides options for two additional ships per year from FY11 to FY14 for a total of ten ships. The intent is for all of these ships to be built in one shipyard, which will benefit from a stable order quantity, training and production efficiencies to drive costs down. Both industry teams will have the opportunity to submit proposals for the FY10 ships under the new solicitation.

[9] Department of Defense, "Littoral Combat Ship Down Select Announced," News Release 722-09, September 16, 2009, available online at http://www.defenselink.mil/releases/release.aspx?releaseid=12984.

> To sustain competition throughout the life of the program and in conjunction with the downselect, the Navy will develop a complete Technical Data Package which will be used to open competition for a second source of the selected design in FY12, awarding one ship with options for up to four additional ships through FY14, to a new shipbuilder.
>
> Our FY10 solicitation will call for the prime to build an additional five combat systems to be delivered as government-furnished equipment for this second source shipyard. Separating the ship and combat systems procurement will enable bringing the LCS combat system into the broader Navy's open architecture plan.
>
> In short, this strategy calls for two shipbuilders in continuous competition for a single LCS seaframe design, and a government-provided combat system.
>
> The revised strategy meets the full spirit and intent of the Weapon Systems Acquisition Reform Act of 2009 by increasing Government oversight, employing fixed price contract types, maximizing competition, leveraging open architecture, using Economic Order Quantity and Block Buy strategies, and ensuring future competition for shipbuilding as enabled by development of a Technical Data Package to solicit ships from a second shipyard.
>
> We also continue to work closely with Congress on the Navy's LCS procurement intentions....
>
> The Navy intends to continue with construction and delivery of LCS 3 and LCS 4, ultimately for use as deployable assets. We will continue to explore all avenues to ensure this is an affordable program.[10]

Under the Navy's proposed strategy, the Navy would award the contract to build the 10 LCSs in the second or third quarter of FY2010.[11]

The Navy briefed CRS and the Congressional Budget Office (CBO) about the proposed new acquisition strategy on September 22, 2009. Points made by the Navy in the briefing included the following:

- The bids from the two industry teams for the three LCSs requested in the FY2010 budget (which were submitted to the Navy in late July or early August 2009[12]) were above the LCS unit procurement cost cap in "all scenarios."
- Negotiations with the industry teams were deemed by the Navy to be not likely to result in award prices for the FY2010 ships that were acceptable to the Navy.
- The Navy judged that the current LCS teaming arrangements "considerably influenced costs" in the FY2010 bids.

[10] Email from Navy Office of Legislative Affairs to CRS, entitled "LCS Way Ahead," September 16, 2009.

[11] Zachary M. Peterson, "Navy Opts to Choose Single Littoral Combat Ship Design in FY-10," *InsideDefense.com (DefenseAlert – Daily News)*, September 16, 2009 (similar articles were published in the September 17, 2009, edition of *Inside the Pentagon* and the September 21, 2009, edition of *Inside the Navy*); Geoff Fein, "New LCS Plan Will Require Industry To Choose Between Being Prime or Shipbuilder," *Defense Daily*, September 18, 2009: 1-2; Christopher P. Cavas, "Will LCS Changes Fix Problems?" Defense News, Sewptember 21, 2009: 1, 8.

[12] See, for example, Christopher P. Cavas, "LCS Bids Submitted to U.S. Navy," *DefenseNews.com*, August 3, 2009, which states: "Lockheed Martin announced its proposal was sent to the Navy on July 31, and rival General Dynamics confirmed its plans were sent in by the Aug. 3 deadline." See also Bettina H. Chavanne, "Lockheed Submits First LS Proposal Under Cost Cap Regulations," *Aerospace Daily & Defense Report*, August 4, 2009: 5.

- The Navy judged that it cannot afford more than a two-ship award in FY2010 within the amount of funding ($1,380 million) requested for LCS sea frame procurement in FY2010.
- In response to the above points, the Navy decided to seek a new acquisition strategy for LCSs procured in FY2010 and subsequent years that would make the LCS program affordable by leveraging competition, providing stability to LCS shipyards and suppliers, producing LCSs at efficient rates, giving industry incentives to make investments that would reduce LCS production costs, and increase commonality in the resulting LCS fleet.
- Under the Navy's proposed new strategy, the winner of the LCS down select would be awarded a contract to build two ships procured in FY2010, with options to build two more ships per year in FY2011-FY2014. The contract would be a block-buy contract augmented with Economic Order Quantity (EOQ) authority, so as to permit up-front batch purchases of long leadtime components, as would be the case under a multiyear procurement (MYP) contract. Unlike an MYP contract, however, the block buy contract would not include a termination liability.
- The winner of the down select would deliver to the Navy a technical data package that would permit another shipyard to build the winning LCS design.
- The Navy would hold a second competition to select a second LCS bidder. This competition would be open to all firms other than the shipyard that is building the 10 LCSs in FY2010-FY2014. The winner of this second competition would be awarded a contract to build up to five LCSs in FY2012-FY2014 (one ship in FY2012, and two ships per year in FY2013-FY2014).
- The Navy would maintain competition between the two shipyards for LCSs procured in FY2015 and subsequent years.
- The prime contactor on the team that wins the LCS down select (i.e., Lockheed or General Dynamics) would provide the combat systems for all the LCSs to be procured in FY2010-FY2014—the 10 that would be built by the first shipyard, and the others that would be built by the second shipyard.
- The structure of the industry team that wins the down select would be altered, with the prime contractor on the team being separated from the shipyard (i.e., the shipyard building the 10 LCSs in FY2010-FY2014). The separation, which would occur some time between FY2010 and FY2014, would be intended in part to prevent an organizational conflict of interest on the part of the prime contractor as it provides combat systems to the two shipyards building LCSs.
- The current combat system used on the selected LCS design will be modified over time to a configuration that increases its commonality with one or more of the Navy's existing surface ship combat systems.
- The Navy intends to complete the construction and delivery of LCS-3 and LCS-4.
- The Navy believes that the proposed acquisition strategy does the following: maximize the use of competition in awarding contracts for LCSs procured in FY2010-FY2014; provide an opportunity for achieving EOQ savings with vendors; provide stability and efficient production quantities to the shipyards and

> vendors; provide an opportunity to move to a common combat system for the LCS fleet; and provide the lowest-possible total ownership cost for the Navy for the resulting LCS fleet, in large part because the fleet would consist primarily of a single LCS design with a single logistics support system. The Navy also believes the proposed strategy is consistent with the spirit and intent of the Weapon Systems Acquisition Reform Act of 2009 (S. 454/P.L. 111-23 of May 22, 2009).

Implicit in the Navy's proposed acquisition strategy is that procurement of LCSs, at least for the next several years, would be limited to a total of four ships per year—a reduction from eventual peak rate of five or six ships per year that were anticipated by the Navy in long-range shipbuilding plans included in Navy budget submissions for FY2009 and prior years.

Also implicit in the Navy's plan is that two LCSs (either LCSs 1 and 3 or LCSs 2 and 4) would be built to a different configuration from all other LCSs, and consequently in terms of their logistic support needs as well, and in this sense would become what some observers refer to as "orphan ships" within the overall fleet.

Issues for Congress

Proposed Acquisition Strategy Announced on September 16, 2009

The Navy's proposed acquisition strategy for LCSs procured in FY2010 and subsequent years poses several potential oversight questions for Congress, including the following:

- Does the timing of the Navy's proposal—very late in the congressional process for reviewing, marking up, and finalizing action on the FY2010 defense budget—provide Congress with sufficient time to adequately review the proposal prior to finalizing its action on the FY2010 defense budget?
- Does the Navy's proposed strategy allow the Navy enough time to adequately evaluate the operational characteristics of the two LCS designs before selecting one of those designs for all future production?
- What risks would the Navy face if the shipyard that wins the competition to build the 10 LCSs in FY2010-FY2014 cannot build them within the contracted cost?
- How does the Navy plan to evolve the combat system on the winning LCS design to a configuration that has greater commonality with one or more existing Navy surface ship combat systems?
- What are the Navy's longer-term plans regarding the two "orphan" LCSs?
- What potential alternatives are there to the Navy's proposed acquisition strategy?

Each of these questions is discussed briefly below.

Enough Time for Adequate Congressional Review of Navy Proposal?

One potential issue for Congress concerning the Navy's proposed acquisition strategy is whether the timing of the Navy's proposal—very late in the congressional process for reviewing, marking

up, and finalizing action on the FY2010 defense budget—provides Congress with sufficient time to adequately review the proposal prior to finalizing its action on the FY2010 defense budget. The announcement of the Navy's proposed acquisition strategy on September 16, 2009, came

- after the defense committees of Congress had held their hearings to review the FY2010 budget submission;
- after the FY2010 defense authorization bill (H.R. 2647/S. 1390) and the DOD appropriations bill (H.R. 3326) had been reported in the House and Senate;
- after both the House and Senate had amended and passed their versions of the FY2010 defense authorization bill, setting the stage for the conference on that bill; and
- after the House had passed its version of the FY2010 DOD appropriations bill.

The timing of the Navy's announcement was a byproduct of the fact that the Navy was not able to see and evaluate the industry bids for the three LCSs requested for FY2010 until August 2009. The September 16, 2009, announcement date may have been the earliest possible announcement date, given the time the Navy needed to consider the situation created by the bids, evaluate potential courses of action, and select the newly proposed acquisition strategy.

Although the Navy might not have been able to present the proposed strategy to Congress any sooner than September 16, the timing of the Navy's announcement nevertheless puts Congress in the position of being asked to approve a major proposal for the LCS program—a proposal that would determine the basic shape of the acquisition strategy for the program for many years into the future—with little or no opportunity for formal congressional review and consideration through hearings and committee markup activities.

A shortage of time for formal congressional review and consideration would be a potential oversight issue for Congress for any large weapon acquisition program, but this might be especially the case for the LCS program, because it would not be the first time that the Navy has put Congress in the position of having to make a significant decision about the LCS program with little or no opportunity for formal congressional review and consideration. As discussed in previous CRS reporting on the LCS program, a roughly similar situation occurred in the summer of 2002, after Congress had completed its budget-review hearings on the proposed FY2003 budget, when the Navy submitted a late request for the research and development funding that effectively started the LCS program.[13]

[13] The issue of whether Congress was given sufficient time to review and consider the merits of the LCS program in its early stages was discussed through multiple editions of past CRS reports covering the LCS program. The discussion in those reports raised the question of whether "Navy officials adopted a rapid acquisition strategy for the LCS program in part to limit the amount of time available to Congress to assess the merits of the LCS program and thereby effectively rush Congress into approving the start of LCS procurement before Congress fully understands the details of the program." The discussion continued:

> With regard to the possibility of rushing Congress into a quick decision on LCS procurement, it can be noted that announcing the LCS program in November 2001 and subsequently proposing to start procurement in FY2005 resulted in a situation of Congress having only three annual budget-review seasons to learn about the new LCS program, assess its merits against other competing DOD priorities, and make a decision on whether to approve the start of procurement. These three annual budget-review seasons would occur in 2002, 2003, and 2004, when Congress would review the Navy's proposed FY2003, FY2004, and FY2005 budgets, respectively. Congress' opportunity to conduct a thorough review of the LCS program in the first two of these three years, moreover, may

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Supporters of the idea of approving the Navy's proposed acquisition strategy as part of Congress's work to finalize action on the FY2010 defense budget could argue one or more of the following:

- The timing of the Navy's proposal, though not convenient for Congress, nevertheless represents a good-faith effort by the Navy to present the proposal to Congress at the earliest possible date. The Navy has conducted multiple briefings with congressional offices starting in September to explain the proposed strategy.
- The LCS program needs to be put on a more stable long-term path as soon as possible, and if Congress does not approve the proposal as part of its work in finalizing action on the FY2010 defense budget, another year will pass before the LCS program can be put on a stable path approved by Congress.
- Although cost growth and construction problems with the LCS program can be viewed as a consequence of past attempts to move ahead too quickly on the LCS program, the Navy's newly proposed acquisition strategy does not risk repeating this experience, because it does not represent another attempt to move ahead on the program at an imprudent speed. To the contrary, the proposal seeks to reduce execution risks by limiting LCS procurement to a maximum of four ships per

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have been hampered:

- **2002 budget-review season (for FY2003 budget)**. The Navy's original FY2003 budget request, submitted to Congress in February 2002, contained no apparent funding for development of the LCS. In addition, the Navy in early 2002 had not yet announced that it intended to employ a rapid acquisition strategy for the LCS program. As a result, in the early months of 2002, there may have been little reason within Congress to view the LCS program as a significant FY2003 budget-review issue. In the middle of 2002, the Navy submitted an amended request asking for $33 million in FY2003 development funding for the LCS program. Navy officials explained that they did not decide until the middle of 2002 that they wanted to pursue a rapid acquisition strategy for the LCS program, and consequently did not realize until then that there was a need to request $33 million in FY2003 funding for the program. By the middle of 2002, however, the House and Senate Armed Services committees had already held their spring FY2003 budget-review hearings and marked up their respective versions of the FY2003 defense authorization bill. These two committees thus did not have an opportunity to use the spring 2002 budget-review season to review in detail the Navy's accelerated acquisition plan for the LCS program or the supporting request for $33 million in funding.
- **2003 budget-review season (for FY2004 budget)**. To support a more informed review of the LCS program during the spring 2003 budget-review season, the conferees on the FY2003 defense authorization bill included a provision (Section 218) requiring the Navy to submit a detailed report on several aspects of the LCS program, including its acquisition strategy. In response to this legislation, the Navy in February 2003 submitted a report of eight pages in length, including a title page and a first page devoted mostly to a restatement of Section 218's requirement for the report. The House and Senate Armed Services committees, in their reports on the FY2004 defense authorization bill, have expressed dissatisfaction with the thoroughness of the report as a response to the requirements of Section 218. (For details, see the "Legislative Activity" section of this report.) It is thus not clear whether the defense authorization committees were able to conduct their spring 2003 budget-review hearings on the FY2004 budget with as much information about the LCS program as they might have preferred.

(See, for example, CRS Report RL 32109, *Navy DD(X), CG(X), and LCS Ship Acquisition Programs: Oversight Issues and Options for Congress*, by Ronald O'Rourke, updated July 29, 2005, pp. CRS-59 to CRS-60. This discussion was carried through multiple updates of CRS reports covering the LCS program.)

year and providing a stable planning environment for LCS shipyards and suppliers.

- If the proposed strategy is not approved by Congress as part of its action on the FY2010 budget, the LCSs procured in FY2010 will be more expensive to procure, since they will not benefit from economies of scale that would come from awarding the FY2010 ships as part of a contract that also includes LCSs to be procured in FY2011-FY2014.

Supporters of the idea of deferring a decision on the Navy's proposed acquisition strategy until the FY2011 budget cycle could argue one or more of the following:

- Navy briefings to Congress on the proposed strategy starting in September, though helpful, are not sufficient for Congress to fully understand the features and potential implications of the Navy's proposed acquisition strategy—much less the relative merits of potential alternatives to that strategy.
- The risks of making a quick decision now on the Navy's proposed acquisition strategy, with little time for formal congressional review and consideration, are underscored by the history of the LCS program, which includes substantial cost growth and construction problems that can be viewed as the consequence of past attempts to move ahead quickly on the program, without more-extensive congressional review and consideration.
- The desire to avoid a paying a relatively high cost for LCSs procured in FY2010, though real, should not be controlling in this situation (i.e., should not be "the tail that wags the dog"). Paying a higher cost for LCSs procured in FY2010, though not optimal, would be an investment that buys time for Congress to more fully review and consider the merits of both the Navy's proposal and potential alternatives to it. Problems avoided through a full congressional review and consideration of the Navy's proposal and potential alternatives during the FY2011 budget cycle could eventually save the Navy a lot more money than the Navy hopes to save on the LCSs procured in FY2010 by procuring them as part of a contract that also includes LCSs to be procured in FY2011-FY2014.
- Approving the Navy's proposed acquisition strategy at this late juncture in the annual congressional process for reviewing and marking up the defense budget would set an undesirable precedent from Congress's standpoint regarding late submissions to Congress of significant proposals for large defense acquisition programs, and encourage DOD to do the same with other large weapon acquisition programs in the future in the hopes of stampeding Congress into making quick decisions on major proposals for those programs.

Navy's Process for Selecting the Winning LCS Design

A second potential issue for Congress concerns the Navy's process for selecting the winning LCS design. This issue has at least two parts: whether the Navy has enough time to adequately evaluate the two LCS designs, and the role of cost versus capability in evaluating the two designs. Each of these is discussed below.

Enough Time for Adequate Navy Evaluation of the Two LCS Designs?

Regarding the question of whether the Navy's proposed acquisition strategy allows the Navy enough time to adequately evaluate the operational characteristics of the two LCS designs before selecting one of those designs for all future production, potential questions for Congress include the following:

- Since LCS-1 as of September 2009 had been in commissioned service for less than a year, and LCS-2 as of that date had not yet been delivered to the Navy, how firm was the basis for the Navy's determination that both LCS designs meet the Navy's operational requirements for LCS?
- By second or third quarter of FY2010—when the Navy plans to award a contract to the winner of the down select—the Navy will have had only a limited time to evaluate the operational characteristics of LCS-1 and LCS-2 through fleet exercises and use in actual Navy deployments. Will the Navy at that point have a sufficient understanding of the two designs' operational characteristics to appropriately treat the operational characteristics of the two designs in the down select?

The Navy and its supporters could argue that the Navy has chosen a preferred design for other new Navy ships (such as the DDG-1000 destroyer) on the basis of paper designs only, and consequently that the Navy would have a firmer basis for performing the LCS down select than it has had on other shipbuilding programs. They can argue that the Navy has a good understanding of the basic differences between the ships—that the Lockheed design, for example, may have better features for supporting small boat operations (which are used for certain LCS missions), while the General Dynamics design may have better features for supporting helicopter and unmanned aerial vehicle (UAV) operations (which are used for certain LCS missions).

Skeptics could argue that the Navy in the past has talked about performing an extensive operational review of each design prior to settling on an acquisition strategy for follow-on ships in the program, and that the innovative nature of the LCS—a modular ship with plug-and-fight mission packages and a small crew—increases the risks associated with selecting a single LCS design before performing such an extensive operational review. Skeptics could argue that the Navy is depriving itself of the opportunity to better understand, through exercises and real-world deployments, the implications for overall fleet operations of building all LCSs to one design or the other before performing the down select.

Role of Cost vs. Capability in Evaluating the Two Designs

Regarding the role of cost vs. capability in evaluating the two LCS designs, a December 14, 2009, press report stated:

> Though the Navy altered its original acquisition plan for the nascent class of Littoral Combat Ships earlier this year citing cost concerns, the price of the two competing designs will not be the single factor in determining which hull is ultimately selected by next summer, service officials said last week.
>
> "Cost is important to us. Obviously the reason we went to this particular strategy was because the costs of the ships were not going down as fast as we had expected them to," Rear Adm. William Landay, the program executive officer for ships at Naval Sea Systems

> Command, told reporters at the Pentagon Dec. 9. "It is a critically important [factor], but at this point, having not formally signed out the [request for proposals for the fifth and sixth ships], I'm not willing to tell you what the order of those priorities are."
>
> In September, the Navy announced that buying three LCS ships, two of one design and a single ship of the other, was no longer fiscally viable. Instead, the service opted to choose between Lockheed Martin's steel monohull LCS design and General Dynamics' aluminum trimaran hull before the end of fiscal year 2010. Each contractor currently has two ships under contract.
>
> The Navy plans to issue the final request for proposals for the fifth and sixth vessels to Lockheed and GD by the end of the month, Landay said during the meeting with reporters.
>
> Earlier this month, Alabama's two senators and Rep. Jo Bonner (R) sent a letter to Navy Secretary Ray Mabus urging the service to consider more than cost as the determining factor in its decision to select between the two competing Littoral Combat Ship designs this fiscal year.
>
> "The draft request for proposals emphasizes cost as the decisive factor in the design decision, placing technological advancements as secondary criteria," Sens. Jeff Sessions (R) and Richard Shelby (R) and Bonner write in the Dec. 3 letter. "This means that price is more important than quality and that performance is not a critical factor."
>
> Allison Stiller, the deputy assistant secretary of the Navy who oversees shipbuilding, said at the Dec. 9 briefing that the draft RFP is "on the street" and discussions with the two competing shipbuilders are ongoing.
>
> "We are also entering into a discussion this week with the Office of the Secretary of Defense staff—a peer review of the draft—before it goes out final, so we're getting the input and feedback from OSD on lessons learned from other acquisition programs and we'll take that into consideration when we put out the formal RFP," Stiller added.
>
> In September, the Navy said in a statement that the acquisition strategy for LCS "will be guided by cost and performance of the respective designs as well as options for sustaining competition throughout the life of the program."[14]

Potential Risks if First Shipyard Cannot Build Ships Within Cost

A third potential issue for Congress concerning the Navy's proposed acquisition strategy concerns the potential risks the Navy would face if the shipyard that wins the competition to build the 10 LCSs in FY2010-FY2014 cannot build them within the contracted cost. The competition between the two existing LCS industry teams to be the winner of the down select could be intense enough to encourage the teams to bid unrealistically low prices for the contract to build the 10 ships.

The Navy and its supporters could argue that the Navy's plan to award a fixed-price contract to the winner of the down select would shift the cost risk on the 10 ships from the government to the shipyard. They could also argue that the Navy plans to carefully evaluate the bid prices submitted by the two industry teams for the down select to ensure that they are realistic, and that the

[14] Zachary M. Peterson, "Cost Not The Single Factor In Navy's Pending Littoral Combat Ship Downselect," *Inside the Navy*, December 14, 2009.

existence of the second LCS shipyard would provide the Navy with an ability to continue building LCSs if production at the first yard were disrupted due to financial issues.

Skeptics could argue that even with a fixed-price contract, the Navy's proposed strategy poses cost risks for the government, because a shipyard could submit an unrealistically low bid so as to win the down select, and then recover its losses on those 10 ships by rolling the losses into prices for downstream ships in the program. Alternatively, the shipyard could present the Navy with the prospect of going out of business and disrupting the LCS production effort unless the Navy were to provide a financial bailout to cover the yard's losses on the 10 ships. Skeptics could argue that Navy decisions dating back to the 1970s to award multi-ship construction contracts to shipyards that had not yet built many ships of the kind in question sometimes led to less-than-satisfactory program outcomes, including substantial financial bailouts.

Increasing LCS Combat System Commonality with Other Combat Systems

A fourth potential issue for Congress regarding the Navy's proposed acquisition strategy concerns the Navy's plan to evolve the combat system on the winning LCS design to a configuration that has greater commonality with one or more existing Navy surface ship combat systems. The Navy in its September 16, 2009, announcement did not provide many details on this part of its proposed acquisition strategy, making it difficult to evaluate the potential costs and risks of this part of the strategy against potential alternatives, including an alternative (which Navy officials have discussed in the past) of designing a new LCS combat system that would, from the outset, be highly common with one or more existing Navy surface ship combat systems.

Navy's Longer-Term Plans Regarding Two "Orphan" Ships

A fifth potential issue for Congress concerning the Navy's proposed acquisition strategy concerns the Navy's longer-term plans regarding the two "orphan" LCSs built to the design that was not selected in the down select. The Navy states that it plans to keep these two ships in the fleet because they will be capable ships and the Navy has an urgent need for LCSs. These two LCSs, however, will have unique logistic support needs, potentially making them relatively expensive to operate and support. At some point, as larger numbers of LCSs enter service, the costs of operating and supporting these two ships may begin to outweigh the increasingly marginal addition they make to total LCS fleet capabilities. Potential alternatives to keeping the ships in the active-duty fleet as deployable assets include selling them to foreign buyers, converting them into research and development platforms, shifting them to the Naval Reserve Force (where they would be operated by crews consisting partially of reservists), or decommissioning them and placing them into preservation (i.e., "mothball") status as potential mobilization assets. Potential questions for Congress include the following:

- Does the Navy intend to keep the two orphan LCSs in the active-duty fleet as deployable assets for a full 25- or 30-year service life?
- If so, how would be the life-cycle operation and support (O&S) costs of these two ships compare to those of the other LCSs? In light of these O&S costs, would it be cost effective to keep these two ships in the active-duty fleet as deployable assets for a full 25- or 30-year service life, particularly as large numbers of LCSs enter service?

- If the Navy does not intend to keep the two orphan LCSs in the active-duty fleet as deployable assets for a full 25- or 30-year service life, when does the Navy anticipate removing them from such service, and what does the Navy anticipate doing with them afterward?

Potential Alternatives to Navy's Proposed Strategy

A sixth potential issue for Congress concerns potential alternatives to the Navy's proposed acquisition strategy for acquiring LCSs procured in FY2010 and subsequent years. A variety of alternatives can be generated by changing one or more elements of the Navy's proposed strategy. One alternative would be a strategy that would keep both LCS designs in production, at least for the time being. Such a strategy might involve the following:

- the use of block-buy contracts with augmented EOQ authority, as under the Navy's proposed acquisition strategy, to continue producing both LCS designs, so as to provide stability to shipyards and suppliers involved in producing both LCS designs;
- the use of Profit Related to Offer (PRO) bidding between the builders of the two LCS designs, so as to generate competitive pressure between them and thereby restrain LCS production costs;[15] and
- designing a new LCS combat system that would have a high degree of commonality with one or more existing Navy surface ship combat systems and be provided as government-furnished equipment (GFE) for use on both LCS designs—an idea that was considered by the Navy at an earlier point in the program.

Supporters of an alternative like the one outlined above could argue that it would:

- provide stability to LCS shipyards and suppliers;
- use competition to restrain LCS production costs;
- permit the Navy to receive a full return on the investment the Navy made in creating both LCS designs;
- reduce the life-cycle operation and support costs associated with building two LCS designs by equipping all LCSs with a common combat system;
- allow the Navy to design an LCS combat system that is, from the outset, highly common with one or more of the Navy's existing surface ship combat systems;
- achieve a maximum LCS procurement rate of four ships per year starting in FY2011 (two years earlier than under the Navy's proposal), thus permitting more LCSs to enter service with the Navy sooner;

[15] Under PRO bidding, the two shipyards would compete not for LCS quantities (because each shipyard would know that it was going to build a certain number of LCSs over the term of their block-buy contracts), but rather for profit, with the lowest bidder receiving the higher profit margin. PRO bidding has been used in other defense acquisition programs where bidders do not compete for quantity. The Navy, for example, began using PRO bidding in the DDG-51 destroyer program it in the 1990s.

- build both LCS designs in substantial numbers, thereby avoiding a situation of having a small number of orphan LCS ships that could have potentially high operation and support costs;
- preserve a potential to neck down to a single LCS design at some point in the future, while permitting the Navy in the meantime to more fully evaluate the operational characteristics of the two designs in real-world deployments; and
- increase the potential for achieving foreign sales of LCSs (which can reduce production costs for LCSs made for the U.S. Navy) by offering potential foreign buyers two LCS designs with active production lines.

Supporters of the Navy's proposed acquisition strategy could argue that an alternative like the one outlined above would, compared to the Navy's proposed strategy:

- achieve lower economies of scale in LCS production costs by splitting production of LCS components between two designs;
- achieve, at the outset of series production of LCSs, less bidding pressure on shipyards, and thus higher LCS production costs, than would be achieved under the Navy's proposed strategy of using a price-based competition to select a single design for all future LCS production;
- miss out on the opportunity to restrain LCS costs by using the level of efficiency achieved in building an LCS design at one shipyard as a directly applicable benchmark for gauging the level of efficiency achieved by the other shipyard in building the same LCS design;
- increase Navy LCS program-management costs and the burden on Navy program-management capabilities by requiring the Navy to continue managing the construction of two very different LCS designs;
- achieve lower economies of scale in LCS operation and support costs because the two LCS designs would still differ in their basic hull, mechanical, and electrical (HM&E) systems, requiring the Navy to maintain two separate HM&E logistics support systems;
- receive only a limited return on the investment the Navy made in developing the two current LCS combat systems (since LCSs in the long run would not use either one), and require the Navy to incur the costs and the technical risks associated with designing a completely new LCS combat system;
- require the Navy to build some number of LCSs with their current combat systems—which are different from one another and from other Navy surface ship combat systems—while awaiting the development of the new LCS combat system, and then incur the costs associated with backfitting these earlier LCSs with the new system when it becomes available;
- send to industry a signal that is undesirable from the government's perspective that if the Navy or other parts or DOD begin producing two designs for a new kind of weapon system, the Navy or DOD would be reluctant to neck production down to a single design at some point, even if government believes that doing so would reduce program costs while still meeting operational objectives; and

- miss out on the opportunity that would be present under the Navy's proposed acquisition strategy to increase the potential for achieving foreign sales of LCSs by offering potential foreign buyers an LCS design that, through U.S. production, enjoys significant economies of scale for both production and operation and support.

Unit Procurement Cost Cap

A second potential issue for Congress for FY2010 was whether and how to amend the LCS unit procurement cost cap, particularly with regard to LCSs funded in FY2010. As mentioned earlier, the Navy stated in a briefing to CRS and CBO on September 22, 2009, that the bids from the two industry teams for the three LCSs requested in the FY2010 budget were above the LCS unit procurement cost cap in "all scenarios," that negotiations with the industry teams were deemed by the Navy to be not likely to result in award prices for the FY2010 ships that were acceptable to the Navy, and that the Navy cannot afford more than a two-ship award in FY2010 within the amount of funding ($1,380 million) requested for LCS sea frame procurement in FY2010.

Prior to the enactment of the FY2010 defense authorization act (H.R. 2647/P.L. 111-84 of October 28, 2009), the cost cap did not include a provision permitting the $460-million figure to be adjusted for inflation. Observers noted that cost caps legislated for other Navy shipbuilding programs have included such a provision.[16]

Cost Growth on LCS Sea Frames

A third potential issue for Congress concerns cost growth on LCS sea frames. Potential questions for Congress on this issue include the following:

- Has the Navy taken sufficient action to prevent further growth in LCS sea frame unit procurement costs?
- How much of the cost increases on LCSs 1 and 2 are attributable to Navy actions in managing the program? To prime contractor performance? To shipyard performance? To performance by supplier firms?
- Concurrency in design and construction has long been known as a source of risk in shipbuilding and other weapon-acquisition programs. Eliminating concurrency forms part of DOD's effort to move toward best practices in acquisition. In retrospect, did the Navy make a good decision in letting its sense of urgency about the LCS override the known risks of concurrency in design and construction?
- In light of cost growth on LCS sea frames, where does the LCS program now stand in relation to the Nunn-McCurdy provision (10 U.S.C. §2433), which requires certain actions to be taken if the cost of a defense acquisition program rises above certain thresholds?

[16] See, for example, Andrea Shalal-Esa, "Navy Unhappy With LCS Bids, Wants Cost Cap Raised," *Reuters*, September 9, 2008; Emelie Rutherford, "Defense Authorization Conferees Weighing Changes To LCS Cost Cap," *Defense Daily*, September 22, 2008.

- Do the estimated costs of LCSs 1 and 2 reflect systems, components, or materials provided by vendors at reduced prices as part of an effort by those vendors to secure a role in the 55-ship LCS program? If so, how much more expensive might these systems, components, or materials become on later LCSs? Is this a source of concern regarding the potential for cost growth on follow-on LCSs?
- How might the increase in LCS unit procurement costs affect the number of LCSs that the Navy can afford to procure each year, and the total number it can afford to procure over the long run?
- Has the Navy financed cost growth on LCS sea frames by reducing funding for the procurement of LCS mission packages? For example, is cost growth on LCS sea frames linked in some way to the reduction in the planned number of LCS mission packages from an earlier figure of 90 to 110 to the current figure of 64? If the Navy has financed cost growth on LCS sea frames by reducing funding for the procurement of LCS mission packages, how might this have affected the capabilities of the planned 55-ship LCS fleet?
- In light of the cost growth, is the LCS program still cost-effective? For follow-on LCSs, what is the unit procurement cost above which the Navy would no longer consider the LCS program cost-effective?
- If Congress had known in 2004, when it was acting on the FY2005 budget that contained funding to procure LCS-1, that LCS sea frame unit procurement costs would increase to the degree that they have, how might that have affected Congress's views on the question of approving the start of LCS procurement?
- How might the increase in LCS unit procurement costs affect the affordability and executability of the Navy's overall shipbuilding program?[17]
- What implications, if any, does the increase in LCS unit procurement costs have for estimated procurement costs of other new Navy ship classes?[18]

Total Program Acquisition Cost

A fourth potential issue for Congress concerns the total acquisition cost of the LCS program. Although this CRS report estimates that a 55-ship LCS program with 64 mission packages might have a total acquisition cost of roughly $29.4 billion, the potential total acquisition cost of the LCS program is uncertain. Supporters could argue that total program acquisition cost will become clearer as the Navy works through the details of the program. Critics could argue that a major acquisition program like the LCS program should not proceed at full pace until its potential total acquisition costs are better understood.

[17] For a discussion of the potential affordability of the Navy's overall shipbuilding program, see CRS Report RL32665, *Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress*, by Ronald O'Rourke.

[18] On this point, CBO testified in March 2008: "The relatively simple design of the LCS and the substantial cost increases that have occurred in the program suggest that the Navy may also have trouble meeting its cost targets for the larger, much more complex surface combatants in its shipbuilding plan, such as the DDG-1000 and the CG(X)." (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. 24.)

Technical Risk

A fifth potential issue for Congress concerns technical risk in the LCS program—an issue that applies to both the LCS sea frame and LCS mission packages.

Seaframe

Regarding technical risk in developing the LCS seaframe, GAO reported the following in March 2009:

> **Technology Maturity**
>
> Fifteen of 19 critical technologies for the two seaframe designs are fully mature, and 2 technologies are approaching maturity. The overhead launch and retrieval system in the LCS 1 design and the aluminum structure in the LCS 2 design are immature. The Navy identified the watercraft launch and recovery concept as a major risk to both seaframe designs. This capability is essential to complete the LCS anti-submarine warfare and mine countermeasures missions. According to the Navy, industry watercraft launch and recovery designs are unproven. To itigate risk, the Navy is conducting launch and recovery modeling and simulation, model basin testing, and experimentation and is encouraging the seaframe industry teams to adopt similar approaches. Final integration of mission package vehicles with each seaframe will not occur until post-delivery test and trials—planned first for LCS 1 in 2010 using the mine countermeasures mission package. Any problems detected could require redesign and costly rework, which could delay the introduction of LCS to the fleet.
>
> **Design and Production Maturity**
>
> The Navy assesses LCS design stability by monitoring changes to requirements documents, execution of engineering change proposals, and the completion of contract deliverables related to drawings, ship specifications, and independent certification of the design. Construction is monitored using earned value management and through evaluation of manufacturing hours spent on rework, deficiencies detected and corrected, and the number of test procedures performed.
>
> The Navy adopted a concurrent design-build strategy for the first two LCS seaframes, which has proven unsuccessful. Contributing challenges included the implementation of new design guidelines, delays in major equipment deliveries, and an unwavering focus on achieving schedule and performance goals. These events drove low levels of outfitting, out-of-sequence work, and rework—all of which increased construction costs. Also, incomplete designs during construction led to weight increases for both seaframes. According to the Navy, this weight growth contributed to a higher than desired center of gravity on LCS 1 that degraded the stability of the seaframe. In fact, an inclining experiment performed during acceptance trials showed LCS 1 may not meet Navy stability requirements for the damaged ship condition. The Navy is taking steps to remove weight and implement stability improvements for LCS 1, while also incorporating design changes for future seaframes.
>
> **Other Program Issues**
>
> As part of LCS 1 acceptance trials, the Navy's Board of Inspection and Survey (INSURV) identified 21 critical "starred" deficiencies and recommended the Chief of Naval Operations authorize delivery of LCS 1 after correction or waiver of these deficiencies. According to Navy officials, only 9 of these deficiencies were corrected prior to delivery. Navy officials report that transiting the ship away from Marinette, Wisconsin, prior to the winter freeze was

a higher priority than timely correction of starred deficiencies. The Navy intends to correct remaining deficiencies during planned post-delivery maintenance availabilities. The Navy plans to hold an INSURV review of LCS 2 upon completion of construction and builder's trials for that seaframe.

Navy officials report that the earned value management systems in each of the LCS shipyards do not meet Defense Contract Management Agency requirements for validation. Thus, the cost and schedule data reported by the prime contractors cannot be considered fully reliable by the Navy when evaluating contractor cost proposals or negotiating for construction of follow-on ships.

Program Office Comments

The Navy stated the LCS program is delivering vital capabilities to the fleet and will be a critical component of the Navy. It noted that LCS 1 was delivered September 18, 2008—6 years and 1 day after the LCS program was established. In fiscal year 2009, the program will deliver a second ship of a completely different design. According to the Navy, while the initial cost and schedule objectives were overaggressive—and necessitated a concurrent design and construction plan—they provided the tension and urgency for these achievements, and lessons learned will be applied to future shipbuilding programs. In August 2008, INSURV evaluated LCS 1 and found it to be "capable, well-built, and inspection-ready." The Navy stated it is leveraging lessons learned from LCS 1 and LCS 2 to ensure future ship awards provide the right mix of capability and affordability.[19]

Mission Packages

Regarding technical risk in developing the modular mission packages for the LCS, GAO reported the following in March 2009:

Technology Maturity

Operation of the MCM, SUW, and ASW packages on the LCS requires a total of 25 critical technologies, including 13 sensors, 5 weapons, and 7 vehicles. Of these technologies, 17 are currently mature and 8 are nearing maturity.

The first of 24 MCM packages was delivered in September 2007 and included 7 of 10 planned mission systems. Four systems are not yet mature; two of these are struggling to reach full maturity. Officials note the Organic Airborne and Surface Influence Sweep is being redesigned to address corrosion issues and the Rapid Airborne Mine Clearance System requires design changes to perform in all environmental conditions. An airborne mine countermeasures system was decertified and its tow cable is being redesigned following the results of testing with the helicopter. The Navy also decertified the Remote Minehunting System during testing in 2007 due to reliability issues, and, according to officials, results of a recent operational assessment are pending. The Navy now plans to deliver the third and fourth mission packages in fiscal year 2011 and has delayed delivery of the baseline package until fiscal year 2012.

The first of 24 SUW packages was delivered in July 2008 and included 1 of 2 planned mission systems. The SUW package includes the fully mature 30mm gun and a variant of the

[19] Government Accountability Office, Defense Acquisitions[:] Assessments of Selected Weapon Programs, GAO-09-326SP, March 2009, p. 106.

Army's Non-Line-of-Sight (NLOS) system (missile and launcher), which is nearing maturity. The first package consisted of two gun engineering development models, without the NLOS launcher or missiles. The NLOS design for LCS has not yet been validated. Integration of the gun with LCS is not complete. A design review for the gun module is scheduled for October 2009. Delivery of a baseline package has been delayed to fiscal year 2013.

The first of 16 ASW packages was delivered in September 2008 and included 4 of 10 planned mission systems. Three systems remain immature including the Unmanned Surface Vehicle's Dipping Sonar, the Remotely Towed Array and the Remotely Towed Array Source. Failure to develop these technologies as expected could increase reliance on the MH-60R helicopter. The Navy has delayed delivery of a second ASW package until fiscal year 2011, and delayed baseline capability from fiscal year 2011 to 2013.

Other Program Issues

The development cost of the LCS packages has increased by more than $300 million, or 64 percent since last year. Procurement costs have decreased for MCM, in part because the delivery of the more expensive baseline capability has been delayed. Reductions in fiscal year 2008 and 2009 budget requests have slowed mission package procurement to account for continuing delays in seaframe acquisition. The explanatory statement accompanying DOD Appropriation Act for Fiscal Year 2009 Congress asked the Navy to develop a plan for fielding the MCM capability independent of LCS. The program office indicates all packages are currently scheduled to undergo operational assessments with both LCS seaframe designs, beginning in June 2010. According to program officials, in September 2008, the Navy conducted a shore based integration exercise using simulated seaframe mission bays. Officials note this activity accelerated MCM mission package integration with both seaframes and reinforced previous crew training.

Program Office Comments

Program officials noted that changes to the program between the 2008 and 2009 president's budgets resulted in an apparent increased development cost. Costs for the SUW package bought in fiscal year 2009 were realigned from procurement to development to support technical and operational evaluations. In addition, data provided to GAO for last year's assessment did not include costs of common equipment that was subsequently distributed among the MCM and ASW packages. The program office acknowledges technical maturity challenges for some mission systems and is working closely with mission system program offices to resolve any issues. The program office is leading a coordinated test approach to prove mission package capabilities and suitability for fleet delivery. The program office also provided technical comments that were incorporated as appropriate. [20]

Options for Congress

Regarding the proposed LCS acquisition strategy announced by the Navy on September 16, 2009, options for Congress, as part of its action on the proposed FY2010 defense, included approving the strategy, rejecting it (perhaps in favor of an alternative, such as the dual-design alternative outlined earlier in this report), modifying it, or deferring a decision on the proposal so as to

[20] Government Accountability Office, *Defense Acquisitions[:] Assessments of Selected Weapon Programs*, GAO-09-326SP, March 2009, p. 108.

provide time next year, during Congress's consideration of the proposed FY2011 defense budget, to more fully review and consider the Navy's proposal and potential alternatives to it.

Regarding the LCS unit procurement cost cap, options for Congress included leaving the cost cap in its current form, deferring its application to FY2011 or some other future fiscal year, or amending the cost cap in various ways, such as increasing the $460 million figure, including a provision for adjusting the cap over time for inflation, or changing the definition of what construction cost elements fall under the cap.

In addition to options regarding the Navy's newly proposed LCS acquisition strategy and the LCS unit procurement cost cap, Congress could approve, reject, or modify the Navy's FY2010 requested quantities and funding levels for LCS sea frames, LCS mission packages, and LCS research and development activities.

Legislative Activity for FY2010

FY2010 Funding Request

The Navy's proposed FY2010 budget, submitted to Congress in early May 2009, requested $1,380 million for the procurement of three more LCSs, $136.7 million for the procurement of LCS mission modules, and $360.5 million in research and development funding for the LCS program. The Navy, in announcing its proposed new LCS acquisition strategy on September 16, 2009, stated that it wanted to procure two LCSs in FY2010 rather than three.

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

House

On March 10, 2009, the Seapower and Expeditionary Forces subcommittee of the House Armed Services Committee held a hearing to review the status of the LCS program. (See **Appendix D** for the full text of the Navy's prepared statement for the hearing.)

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 $1,380 million in procurement funding for the procurement of three LCSs (page 70, line 013), $136,7 million in procurement funding for the procurement of LCS mission modules (page 78, line 029), and $360.5 million in research and development funding for the LCS program (page 164, line 048).

Section 121 of H.R. 2647, as summarized in the committee's report,

> would strike section 124 of the National Defense Authorization Act for fiscal year 2006 (Public Law 109–163), as amended, with a restructured cost cap provision that contains similar requirements as cost caps of other ship programs. Additionally, the section would authorize the Secretary to obligate funds authorized and appropriated to the Littoral Combat Ship (LCS) program to compile a technical data package necessary for competitive bid ding of the vessels to other shipbuilding contractors if the Secretary was unable to enter into construction contracts in fiscal year 2010 with the current contractors due to limitations of the cost cap. The changes to the limitation on cost for LCS, made by subsection (a), (c), and

(f) are not effective until the Secretary of the Navy accepts delivery of LCS 1 and LCS2 and makes certain certifications to the congressional defense committees. (Pages 123-124)

The text of Section 121 is as follows:

SEC. 121. LITTORAL COMBAT SHIP PROGRAM.

(a) Limitation of Costs- Except as provided in subsection (b) or (c), of the amounts authorized to be appropriated in this Act or otherwise made available for fiscal year 2010 or any fiscal year thereafter for the procurement of Littoral Combat Ship vessels, not more than $460,000,000 may be obligated or expended for each vessel procured (not including amounts obligated or expended for elements designated by the Secretary of the Navy as a mission package).

(b) Specific Requirement for Fiscal Year 2010- Of the amounts authorized to be appropriated in this Act or otherwise made available for fiscal year 2010 or any fiscal year thereafter for shipbuilding conversion, Navy, the Secretary of the Navy may obligate not more than $80,000,000 to produce a technical data package for each type of Littoral Combat Ship vessel, if the Secretary—

(1) is unable to—

(A) submit to the congressional defense committees a certification under subsection (g) during fiscal year 2010; and

(B) enter into a contract for the construction of a Littoral Combat Ship vessel in fiscal year 2010 because of the limitation of costs in section 124 of the National Defense Authorization Act for Fiscal Year 2006 (P.L. 109-163; 119 Stat. 3157), as amended; or

(2) is unable to enter into a contract for the construction of a Littoral Combat Ship vessel in fiscal year 2010 because of the limitation of costs in subsection (a) after submitting to the congressional defense committees a certification under subsection (g).

(c) Adjustment of Limitation Amount- With respect to the procurement of a Littoral Combat Ship vessel referred to in subsection (a), the Secretary may adjust the amount set forth in such subsection by the following:

(1) The amounts of increases or decreases in costs attributable to economic inflation after September 30, 2009.

(2) The amounts of increases or decreases in costs attributable to compliance with changes in Federal, State, or local laws enacted after September 30, 2009.

(3) The amounts of outfitting costs and post-delivery costs incurred for the vessel.

(4) The amounts of increases or decreases in costs attributable to the insertion of new technology into the vessel, as compared to the technology used in the first and second Littoral Combat Ship vessels procured by the Secretary, if the Secretary determines, and certifies to the congressional defense committees, that insertion of the new technology—

(A) would lower the life-cycle cost of the vessel; or

(B) is required to meet an emerging threat and the Secretary of Defense certifies to those committees that such threat poses grave harm to national security.

(d) Annual Reports- At the same time that the budget is submitted under section 1105(a) of title 31, United States Code, for each fiscal year, the Secretary shall submit to the congressional defense committees a report on Littoral Combat Ship vessels. Such report shall include the following:

(1) Written notice of any change in the amount set forth in subsection (a) that is made under subsection (c).

(2) Information, current as of the date of the report, regarding—

(A) the content of any element of the vessels that is designated as a mission package;

(B) the estimated cost of any such element; and

(C) the total number of such elements anticipated.

(3) Actual and estimated costs associated with—

(A) the material and equipment for basic construction of each vessel; and

(B) the material and equipment for propulsion, weapons, and communications systems of each vessel.

(4) Actual and estimated man-hours of labor and labor rates associated with each vessel being procured (listed separately from any other man-hours and labor rates data).

(5) Actual and estimated fees paid to contractors for meeting contractually obligated cost and schedule performance milestones.

(e) Definitions- In this section:

(1) The term `mission package' means the interchangeable combat systems that deploy with a Littoral Combat Ship vessel.

(2) The term `technical data package' means a compilation of detailed engineering plans for construction of a Littoral Combat Ship vessel.

(f) Conforming Repeal- Section 124 of the National Defense Authorization Act for Fiscal Year 2006 (P.L. 109-163) is repealed.

(g) Effective Date-

(1) LIMITATION ON COSTS- Subsections (a) and (c) shall take effect on the date that is 15 days after the date on which the Secretary of the Navy certifies in writing to the congressional defense committees the following:

(A) The Secretary has accepted delivery of the USS Freedom (LCS 1) and the USS Independence (LCS 2) following successful completion of acceptance trials.

(B) The repeal of section 124 of the National Defense Authorization Act for Fiscal Year 2006 (P.L. 109-163; 119 Stat. 3157) made by subsection (f) is necessary for the Secretary to—

(i) award a contract for a Littoral Combat Ship vessel in fiscal year 2010; and

(ii) maintain sufficient government oversight of the Littoral Combat Ship vessel program.

(C) The Secretary has conducted a thorough analysis of the requirements for the performance, system, and design of both Littoral Combat Ship variants and determined that further changes to such requirements will not reduce—

(i) the cost of either such variant; and

(ii) the warfighting utility of such vessel.

(D) A construction contract for a Littoral Combat Ship vessel in fiscal year 2010 will be awarded only to a contractor that—

(i) with respect to a contract for the Littoral Combat Ship vessel awarded in fiscal year 2009—

(I) is maintaining excellent cost and schedule performance; and

(II) the Secretary determines that the affordability and efficiency of the construction of such a vessel are improving at a satisfactory rate; and

(ii) based on the data available from the developmental and operational assessment testing of such contractor's vessel and associated mission packages, the Secretary, in consultation with the Chief of Naval Operations, has determined that it is in the best interest of the Navy to procure such additional Littoral Combat Ship vessels prior to the completion of operational test and evaluation.

(E) With respect to funds that are available for shipbuilding and conversion, Navy, for fiscal year 2010 for the procurement of Littoral Combat Ship vessels—

(i) such funds are sufficient to award contracts for three additional Littoral Combat Ship vessels; or

(ii) if such funds are insufficient to award contracts for three additional Littoral Combat Ship vessels, the Secretary has the ability to promote competition for the Littoral Combat Ship vessels that are procured in order to ensure the best value to the Government.

(2) REPEAL- The repeal of section 124 of the National Defense Authorization Act for Fiscal Year 2006 (P.L. 109-163; 119 Stat. 3157) made by subsection (f) shall take effect on the date that is 15 days after the date on which the certification under paragraph (1) is received by the congressional defense committees.

The committee's report states that "the committee maintains cautious support for the Littoral Combat Ship and believes a minimum of three of these vessels should be requested per year" and that "the committee recommends that the Navy consider combining acquisition efforts with the U.S. Coast Guard in procurement of the National Security Cutter vessel for use as a Navy frigate." (Page 72)

The report also states:

Littoral combat ship

This program was envisioned as the affordable way to deliver significant capability to the fleet in the shortest time possible. Neither affordability nor timeliness has resulted from this

> troubled program. As of this report, only one vessel has been delivered to the Navy, significantly over target cost, with a second due to be delivered later in calendar year 2009, also significantly over target cost.
>
> While the committee is aware that the cost and schedule problems associated with this program are shared by both the contractors and the government, the fact remains that the costs of the first vessels are too high. The committee is encouraged by recent actions taken by the Assistant Secretary of the Navy for Research, Development, and Acquisition to restore competition for quantity between the two prime contractors by combining the request for proposals of the fiscal year 2009 and fiscal year 2010 ships. The committee is also aware that the Navy now more fully understands the costs associated with construction of these vessels. Therefore, the committee includes a provision elsewhere in this Act [Section 121] that would modify the structure of the existing cost cap for the littoral combat ship (LCS) program similar to the requirements of cost caps on other ship programs. The provision would also allow, for fiscal year 2010, the Secretary of the Navy to use funds authorized and appropriated to the program to develop a technical data package of each vessel if the Secretary is unable to enter into contracts for LCS vessels within the requirements of the cost cap. These technical data packages would be for use in bidding construction of the vessels to other contractors.
>
> The committee expects the Navy, in moving forward with this program over the next few years, to transition the current acquisition program, which currently requires performance specifications for the ships to a program where the government either supplies, as government furnished equipment (GFE), or specifies the weapons system, communication system, and the propulsion system. To the greatest extent possible, the committee expects that those systems would be common between the two versions of the LCS vessels. The committee additionally expects that when the Navy is in a position to make that transition, that domestically produced major equipment will be specifically specified or supplied to the shipbuilder as GFE. (Pages 74-75)

The report presents the additional views of certain committee members on the LCS on pages 671-672.

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 $1,380 million in procurement funding for the procurement of three LCSs (page 619, line 013 of the printed bill), $136,7 million in procurement funding for the procurement of LCS mission modules (page 621, line 029), and $360.5 million in research and development funding for the LCS program (page 675, line 048).

Section 111 of S. 1390 as reported would require the LCS program to be treated as a Major Defense Acquisition Program (MDAP) for purposes of government management and oversight of the program. The text of Section 111 is as follows:

> SEC. 111. TREATMENT OF LITTORAL COMBAT SHIP PROGRAM AS A MAJOR DEFENSE ACQUISITION PROGRAM.

> Effective as of the date of the enactment of this Act, the program for the Littoral Combat Ship shall be treated as a major defense acquisition program for purposes of chapter 144 of title 10, United States Code.

Section 112 would require the Navy to submit a report to the congressional defense committees on its plan for homeporting LCSs. The text of Section 112 is a follows:

> SEC. 112. REPORT ON STRATEGIC PLAN FOR HOMEPORTING THE LITTORAL COMBAT SHIP.
>
> (a) Report Required- Not later than 90 days after the date of the enactment of this Act, the Secretary of the Navy shall submit to the congressional defense committees a report setting forth the strategic plan of the Navy for homeporting the Littoral Combat Ship (LCS) on the East Coast and West Coast of the United States.
>
> (b) Elements- The report required by subsection (a) shall include the following:
>
> (1) The requirements for homeporting of the Littoral Combat ship of the commanders of the combatant commands, set forth by geographic area of responsibility (AOR).
>
> (2) A description of the manner in which the Navy will meet the requirements identified under paragraph (1).
>
> (3) An assessment of the effect of each type of Littoral Combat Ship on each port in which such ship could be homeported.
>
> (4) A map, based on the current plan of 55 Littoral Combat Ships, identifying where each ship will homeport and how such ports will accommodate both types of Littoral Combat Ships, based on the current program and a 313-ship Navy.
>
> (5) An estimate of the costs of infrastructure required for Littoral Combat Ships at each homeport, including—
>
> (A) existing infrastructure; and
>
> (B) such upgraded infrastructure as may be required.

Section 114 requires the Navy to submit to the congressional defense committees a report on the possibility of a service life extension program (SLEP) for Oliver Hazard Perry (FFG-7) frigates that is to include, among other things, the Navy's strategic plan for the LCS to fulfill roles and missions currently performed by FFG-7s, and the strategic plan for the LCS if a SLEP were performed on the FFG-7s. The text of Section 114 is as follows:

> SEC. 114. REPORT ON A SERVICE LIFE EXTENSION PROGRAM FOR OLIVER HAZARD PERRY CLASS FRIGATES.
>
> Not later than 90 days after the date of the enactment of this Act, the Secretary of the Navy shall submit to the congressional defense committees a report setting forth the following:
>
> (1) A detailed analysis of a service life extension program (SLEP) for the Oliver Hazard Perry class frigates (FFGs), including—
>
> (A) the cost of the program;

(B) a schedule for the program; and

(C) the shipyards available to carry out the work under the program.

(2) A detailed plan of the Navy for achieving a 313-ship fleet as contemplated by the 2006 Quadrennial Defense Review, including a comparison for purposes of that plan of decommissioning Oliver Hazard Perry class frigates as scheduled with extending the service life of such frigates under the service life extension program.

(3) The strategic plan of the Navy for the manner in which the Littoral Combat Ship (LCS) will fulfill the roles and missions currently performed by the Oliver Hazard Perry class frigates as they are decommissioned.

(4) The strategic plan of the Navy for the Littoral Combat Ship if the extension of the service life of the Oliver Hazard Perry class frigates alleviates demand arising under the current capabilities gap in the Littoral Combat Ship.

(5) A description of the manner in which the Navy has met the needs of the United States Southern Command over time, including the assets and vessels the Navy has deployed for military-to-military engagements, UNITAS exercises, and counterdrug operations in support of the Commander of the United States Southern Command during the five-year period ending on the date of the report.

Regarding Section 111, the committee's report states:

Treatment of Littoral Combat Ship program as a major defense acquisition program (sec. 111)

The committee recommends a provision that would require the Department to manage and report on the Littoral Combat Ship (LCS) program as a major defense acquisition program (MDAP).

The Weapon Systems Acquisition Reform Act of 2009 (Public Law 111–23) emphasizes the need to start acquisition programs on sure footing as a central mechanism by which the Department of Defense (DOD) can get control of cost growth and schedule slippage on MDAP programs. The cost and schedule reporting requirements in chapter 144 of title 10, United States Code, play a key role in ensuring that the Department and Congress are aware of emerging problems in such programs.

The Navy was able to avoid this oversight in the case of the LCS program by claiming that the program was just to build a handful of ships to test their capabilities and then see what the Navy wanted to build later. From the outset of the LCS program, however, program proponents within the Navy, including all three Chiefs of Naval Operations in office during the development of the LCS program, have invariably called this a 55–ship program. Some officials have even suggested that it might grow to be larger than that. The Weapon Systems Acquisition Reform Act of 2009 amended section 2430 of title 10, United States Code, to ensure that the Department include future program spirals in assessing whether a program should fall within the definition of a MDAP. That modification alone should cause DOD to define LCS as a MDAP, but the committee recommends this provision to remove any discretion in treating this program.

Had the Navy leadership been operating within the spirit of the title 10, United States Code, provisions regarding MDAPS, LCS would have fallen under the management and reporting requirements required for MDAPs. No one can say that MDAP oversight would have

> prevented the problems of poor requirements generation, poor requirements control, poor program oversight, insufficient supervision of program execution, and abysmal cost estimating. However, when a program is expected to cost roughly $12.0 billion (even under the rosiest cost scenario), it should be subject to the requirements development, cost estimating, acquisition planning, and other requirements established in statute and regulation for the beginning of MDAP programs. Otherwise, we will have little chance of fixing such programs after they fall into trouble, and DOD will never be able to get control of its acquisition problems. (Pages 12-13)

The report also states, as part of a discussion of another shipbuilding program:

> The committee certainly believes that the services should have the ability to change course as the long-term situation dictates. However, since we are talking about the long-term and hundreds of billions of dollars of development and production costs for MDAPs, the committee believes that the Defense Department should exercise greater rigor in making sure such course corrections are made with full understanding of the alternatives and the implications of such decisions, rather than relying on inputs from a handful of individuals. The committee has only to look at the decision-making behind the major course correction in Navy shipbuilding that yielded the Littoral Combat Ship (LCS) to be concerned by that prospect. (Pages 13-14)

Conference

The conference report (H.Rept. 111-288 of October 7, 2009) on H.R. 2647/P.L. 111-84 of October 28, 2009, authorizes $1,380.0 million (the requested amount) in FY2010 LCS procurement funding, and the procurement of two LCSs in FY2010. (Page 939)

The conference report contains three provisions relating directly to the LCS program: Section 121 provides the Navy the contracting authority to implement the LCS acquisition strategy that the Navy announced on September 16, 2009, and amends the LCS unit procurement cost cap. Section 122 requires the LCS program to be treated as a major defense acquisition program (MDAP) for purposes of program management and oversight. Section 123 requires a report on the Navy's plan for homeporting LCSs.

Section 121 states:

> SEC. 121. LITTORAL COMBAT SHIP PROGRAM.
>
> (a) CONTRACT AUTHORITY.—
>
> (1) IN GENERAL.—The Secretary of the Navy may procure up to ten Littoral Combat Ships and 15 Littoral Combat Ship ship control and weapon systems by entering into a contract using competitive procedures. Such procurement may also include—
>
> (A) materiel and equipment in economic order quantities when cost savings are achievable; and
>
> (B) cost reduction initiatives.
>
> (2) LIABILITY.—A contract entered into under paragraph (1) shall provide that any obligation of the United States to make a payment under the contract is subject to the availability of appropriations for that purpose, and that total liability to the Government for

termination of any contract entered into shall be limited to the total amount of funding obligated at time of termination.

(b) TECHNICAL DATA PACKAGE.—

(1) REQUIREMENT.—As part of the solicitation for proposals for a procurement authorized by subsection (a), the Secretary shall require that an offeror submit a proposal that provides for conveying a complete technical data package as part of a proposal for a Littoral Combat Ship.

(2) RIGHTS OF THE UNITED STATES.—The Secretary shall ensure that the Government's rights in technical data for a Littoral Combat Ship are sufficient to permit the Government to—

(A) conduct a competition for a second shipyard, as soon as practicable; and

(B) transition the Littoral Combat Ship combat systems to Government-furnished equipment to achieve open systems.

(c) LIMITATION OF COSTS.—

(1) LIMITATION.—Except as provided in subsection (d), and excluding amounts described in paragraph (2), beginning in fiscal year 2011, the total amount obligated or expended for the procurement of a Littoral Combat Ship awarded to a contractor selected as part of a procurement authorized by subsection (a) may not exceed $480,000,000 per vessel.

(2) EXCLUSION.—The amounts described in this paragraph are amounts associated with the following:

(A) Elements designated by the Secretary of the Navy as a mission package.

(B) Plans.

(C) Technical data packages.

(D) Class design services.

(E) Post-delivery, outfitting, and program support costs.

(d) WAIVER AND ADJUSTMENT OF LIMITATION AMOUNT.—

(1) WAIVER.—The Secretary of the Navy may waive the limitation in subsection (c)(1) with respect to a vessel if—

(A) the Secretary provides supporting data and certifies in writing to the congressional defense committees that—

(i) the total amount obligated or expended for procurement of the vessel—

(I) is in the best interest of the United States; and

(II) is affordable, within the context of the annual naval vessel construction plan required by section 231 of title 10, United States Code; and

(ii) the total amount obligated or expended for procurement of at least one other vessel authorized by subsection (a) has been or is expected to be less than $480,000,000; and

(B) a period of not less than 30 days has expired following the date on which such certification and data are submitted to the congressional defense committees.

(2) ADJUSTMENT.—The Secretary of the Navy may adjust the amount set forth in subsection (c)(1) for Littoral Combat Ship vessels referred to in that subsection by the following:

(A) The amounts of increases or decreases in costs attributable to economic inflation after September 30, 2009.

(B) The amounts of increases or decreases in costs attributable to compliance with changes in Federal, State, or local laws enacted after September 30, 2009.

(C) The amounts of increases or decreases in costs of the vessel that are attributable to insertion of new technology into that vessel, as compared to the technology built into the first or second vessels of the Littoral Combat Ship class of vessels, if the Secretary determines, and certifies to the congressional defense committees, that insertion of the new technology—

(i) is expected to decrease the life-cycle cost of the vessel; or

(ii) is required to meet an emerging threat that poses grave harm to national security.

(D) The amounts of increases or decreases in costs required to correct deficiencies that may affect the safety of the vessel and personnel or otherwise preclude the vessel from safe operations and crew certifications.

(e) ANNUAL REPORTS.—At the same time that the budget is submitted under section 1105(a) of title 31, United States Code, for each fiscal year, the Secretary of the Navy shall submit to the congressional defense committees a report on Littoral Combat Ship vessels. Each such report shall include the following:

(1) The current (as of the date of the report) and projected total basic construction costs, Government-furnished equipment costs, and other program costs associated with each of the Littoral Combat Ships under construction.

(2) Written notice of any adjustment in the amount set forth in subsection (c)(1) made during the preceding fiscal year that the Secretary adjusted under the authority provided in subsection (d)(2).

(3) A summary of investment made by the Government for cost-reduction initiatives and the projected savings or cost avoidance based on those investments.

(4) A summary of investment made by the construction yard to improve efficiency and optimization of construction along with the projected savings or cost avoidance based on those investments.

(5) Information, current as of the date of the report, regarding—

(A) the content of any element of the Littoral Combat Ship class of vessels that is designated as a mission package;

(B) the estimated cost of any such element; and

(C) the total number of such elements anticipated.

(f) DEFINITIONS.—In this section:

(1) The term ''mission package'' means the interchangeable systems that deploy with a Littoral Combat Ship vessel.

(2) The term ''technical data package'' means a compilation of detailed engineering plans and specifications for construction of the vessels.

(3) The term ''total amount obligated or expended for procurement'', with respect to a Littoral Combat Ship, means the sum of the costs of basic construction and Government-furnished equipment for the ship.

(g) CONFORMING REPEAL.—Section 124 of the National Defense Authorization Act for Fiscal Year 2006 (Public Law 109–163; 119 Stat. 3157), as amended by section 125 of the National Defense Authorization Act for Fiscal Year 2008 (Public Law 110–181; 122 Stat. 29) and section 122 of the Duncan Hunter National Defense Authorization Act for Fiscal Year 2009 (Public Law 110–417; 122 Stat. 4376), is repealed.

Regarding Section 121, the conference report states:

Littoral Combat Ship program (sec. 121)

The House bill contained a provision (sec. 121) that would restructure the cost cap for the Littoral Combat Ship (LCS) program, subject to certain prerequisites and certifications. The bill would also authorize the Secretary to obligate funds to compile a technical data package necessary for future competition.

The Senate amendment contained no similar provision.

The Senate recedes with an amendment that would provide authority to the Secretary of the Navy to implement a new acquisition strategy, as requested by the Secretary, that would utilize a block-buy approach for the procurement of LCS vessels during the period of fiscal year 2010 through 2014, and would include authority to obligate funds for economic order quantity buys and cost reduction initiatives, should such measures improve overall program affordability. The conferees note that, unlike a multiyear procurement, a block-buy is useful here in that it conveys a long-term commitment by the Government to execute the program in a way that allows the Government to extract economic advantages from its purchases. However, a block-buy does not bind the government to performance under a multiyear contract, thereby subjecting the government to liability for cancellation or termination costs in the event of non-performance under the contract.

In addition, the amendment would apply a revised cost cap to the fiscal 2011 ships, which could be waived under certain circumstances. The amendment would also require the Navy to obtain a technical data package from the winning LCS contractor.

The conferees support the revised acquisition strategy for the program, which is based upon many of the principles long advocated by the conferees, including enhancing competition, assuring more program stability, achieving more efficient construction rates, incentivizing industry investment, and increasing commonality.

The conferees recognize that the existing cost cap for the LCS program has been effective, prohibiting the Navy from awarding an unaffordable contract in fiscal year 2010. Consequently, the conferees agree to retain a cost cap, while giving the Secretary of the Navy significant discretion in the award of the fiscal year 2010 through 2014 ships. The conferees intend the cost cap described in subsection (c)(1) to apply to the fiscal year 2011 ships and any additional ship constructed through 2014 at the shipyard that is a member of the contractor team selected in response to the solicitation for the fiscal year 2010 ships.

The conferees expect that, if contractors and suppliers respond to this solicitation with aggressive pricing proposals that result in a more affordable program, the government will guarantee long-term stability in the procurement plan. The conferees believe that, with aggressive construction yard investment and ''design for affordability'' changes, costs for vessels should continue to decline (in constant dollars) over the period of the block-buy.

The amendment would also require that the Navy report yearly on specific costs incurred in the construction of LCS vessels and adjustments to the cost caps. The conferees intend that this annual report would assist in providing strong oversight on the costs of this program. If the Navy and contractors are unable to achieve significant cost savings under this new acquisition strategy, the conferees' support for this program will not be assured. (Pages 678-679)

Section 122 states:

SEC. 122. TREATMENT OF LITTORAL COMBAT SHIP PROGRAM AS A MAJOR DEFENSE ACQUISITION PROGRAM.

Effective as of the date of the enactment of this Act, the program for the Littoral Combat Ship shall be treated as a major defense acquisition program for purposes of chapter 144 of title 10, United States Code.

Regarding Section 122, the conference report states:

Treatment of Littoral Combat Ship program as a major defense acquisition program (sec. 122)

The Senate amendment contained a provision (sec. 111) that would require the Littoral Combat Ship program be designated as a major defense acquisition program.

The House bill contained no similar provision.

The House recedes.

The conferees note that the Weapon Systems Acquisition Reform Act of 2009 (Public Law 111–23), if interpreted properly, would require this program already to be so designated. (Page 679)

Section 123 states:

SEC. 123. REPORT ON STRATEGIC PLAN FOR HOMEPORTING THE LITTORAL OMBAT SHIP.

(a) REPORT REQUIRED.—At the same time that the budget is submitted under section 1105(a) of title 31, United States Code, for fiscal year 2011, the Secretary of the Navy shall submit to the congressional defense committees a report setting forth the strategic plan of the

> Navy for homeporting the Littoral Combat Ship on the east coast and west coast of the United States.
>
> (b) ELEMENTS.—The report required by subsection (a) shall include the following:
>
> (1) An analysis of how the homeporting plan would support the requirements of the commanders of the combatant commands, by geographic area of responsibility, for the capabilities delivered by Littoral Combat Ships, including the notional transit times to the various geographic areas of responsibility.
>
> (2) An assessment of the effect that each type of Littoral Combat Ship would have on each port in which such ship could be homeported, including an identification of the infrastructure required to support each such ship with respect to—
>
> (A) the availability of pier space with supporting ship services infrastructure, taking into account the largest fleet size envisioned by the long-term plan for the construction of naval vessels submitted for fiscal year 2011;
>
> (B) the logistical and maintenance support services required in any port chosen for the Littoral Combat Ships; and
>
> (C) any investment in naval station infrastructure required for homeporting Littoral Combat Ships (including a plan for such investment).
>
> (3) With respect to the projected force structure size of the Navy in fiscal year 2020, a graphical depiction of the total planned ships berthing in the pier areas of any naval facility chosen to homeport Littoral Combat Ships, including the identification of the ships berthing plan for the maximum number of ships expected in-port at any one time.

Regarding Section 123, the conference report states:

> *Report on strategic plan for homeporting the Littoral Combat Ship (sec. 123)*
>
> The Senate amendment contained a provision (sec. 112) that would require the Secretary of the Navy to submit a strategic plan for homeporting vessels in the Littoral Combat Ship program.
>
> The House bill contained no similar provision.
>
> The House recedes with technical amendments. (Page 679)

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 procuring four LCSs in FY2010—one more than the Navy's request. The report recommends increasing by $780 million the Navy's FY2010 procurement funding request for the LCS program, of which $540 would be for the fourth LCS and $240 million would be to "properly price" the three other LCSs requested for procurement for FY2010. (Page 164) Under this recommendation, the four LCSs would be procured at a total cost of $2,160 million, or an average of $540 million each. The committee's report states:

LITTORAL COMBAT SHIP

> The Littoral Combat Ship is envisioned as a fast, agile, networked surface combatant with capabilities designed to meet asymmetric threats and assure access into littoral regions. The program has experienced numerous problems during construction of the first two vessels, resulting in cost growth and schedule slippage. Although the program appears to have most of the technical issues resolved, the cost of the fiscal year 2010 ships will be subject to a cost cap to better control the cost of the program. The request contains sufficient funding for the program costs that will be subject to the cost cap, however, it lacks certain costs that are outside of the cost cap (such as design work and government costs). Therefore, the recommendation provides $2,160,000,000, an increase of $780,000,000 above the request, to fully fund the construction of the three Littoral Combat Ships in the request, as well as an additional ship to provide an increase in the quantity of ships for fiscal year 2010. (Page 165)

Senate

The Senate Appropriations Committee, in its report (S.Rept. 111-74 of September 10, 2009) on H.R. 3326, recommends procuring two LCSs in FY2010—one less than the Navy's request. The report recommends reducing by $300 million the Navy's FY2010 procurement funding request for the LCS program, so that the two ships recommended for procurement would be procured at a total cost of $1,080 million, or an average of $540 million each. (Pages 112 and 113) The committee's report states:

> *Littoral Combat Ship [LCS]*.—The fiscal year 2010 budget request included $1,380,000,000 for the construction of three littoral combat ships. The Committee notes that the budget request of $460,000,000 per ship is insufficient to execute a procurement of three ships in fiscal year 2010. Therefore, in order to provide for a more executable program in fiscal year 2010, the Committee recommends $1,080,000,000 for the construction of two littoral combat ships at a cost $540,000,000 per ship. This is a reduction of $300,000,000 and one ship from the budget request.
>
> While the Committee continues to support the LCS program and believes that the Navy is making progress, concerns remain with the cost and schedule performance as well as the future acquisition strategy for the program. The Committee is also becoming concerned with the LCS's ability to operate with the various mission modules and would encourage the Navy to demonstrate this capability earlier than the current plan of the third quarter of fiscal year 2011. (Page 113)

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 provides $1,080 million for the procurement of two LCSs, or an average of $540 million per ship. (Page 166) The explanatory statement states:

LITTORAL COMBAT SHIP (LCS)

> The recommendation includes $1,080,000,000 for the construction of two Littoral Combat Ships (LCS), a reduction of $300,000,000 and one ship from the budget request. This adjustment properly prices the program and is consistent with the Navy's revised acquisition strategy for the LCS program which calls for down selecting to a single ship design in fiscal year 2010, versus the two designs that the program has been carrying. The recommendation supports this strategy which should result in reduced program costs as a result of reducing the overhead within the program. Further, the recommendation provides an additional $60,000,000 to the LCS research and development program for the development of a technical data package that will allow a future second source of the winning LCS design.
>
> Additionally, in compliance with previous congressional direction, the Assistant Secretary ofthe Navy for Research, Development, and Acquisition (ASN (RDA» provides the congressional defense committees a monthly progress report on LCS construction costs. Presently, these reports provide cost information only for the first two LCS platforms (LCS-I and LCS-2). The ASN (RDA) is directed to provide the same monthly cost reports for LCS-3 and LCS-4 upon enactment of this Act. (Pages 168-169)

The explanatory statement states that a rescission of $84.8 million in FY2009 Other Procurement, Navy (OPN) funding that is made by Section 8042 of the act includes a rescission of $66 million for LCS mission modules. (Page 363)

Appendix A. Cost Growth on LCS Sea Frames

This appendix presents details on cost growth on LCS sea frames from the FY2006 budget cycle through the FY0209 budget cycle.

2006

The proposed FY2007 Navy budget, submitted in February 2006, showed that:

- the estimate for the first LCS had increased from $215.5 million in the FY2005 budget and $212.5 million in the FY2006 budget to $274.5 million in the FY2007 budget—an increase of about 27% from the FY2005 figure and about 29% form the FY2006 figure;
- the estimate for the second LCS increased from $213.7 million in the FY2005 budget and $256.5 million in the FY2006 budget to $278.1 million—an increase of about 30% from the FY2005 figure and about 8% from the FY2006 figure; and
- the estimate for follow-on ships scheduled for FY2009-FY2011, when the LCS program was to have reached a planned maximum annual procurement rate of six ships per year, had increased from $223.3 million in the FY2006 budget to $298 million—an increase of about 33%.

The Navy stated in early 2006 that the cost increase from the FY2006 budget to the FY2007 budget was due mostly to the fact that LCS procurement costs in the FY2006 budget did not include items that are traditionally included in the so-called end cost—the total budgeted procurement cost—of a Navy shipbuilding program, such as Navy program-management costs, an allowance for changes, and escalation (inflation). The absence of these costs from the FY2006 LCS budget submission raised certain potential oversight issues for Congress.[21]

2007

On January 11, 2007, the Navy reported that LCS-1 was experiencing "considerable cost overruns." The Navy subsequently stated that the estimated shipyard construction cost of LCS-1 had grown to $350 million to $375 million. This suggested that the end cost of LCS-1—which

[21] These oversight issues included the following:

—Why were these costs excluded? Was this a budget-preparation oversight? If so, how could such an oversight occur, given the many people involved in Navy budget preparation and review, and why did it occur on the LCS program but not other programs? Was anyone held accountable for this oversight, and if so, how? If this was not an oversight, then what was the reason?

—Did the Navy believe there was no substantial risk of penalty for submitting to Congress a budget presentation for a shipbuilding program that, for whatever reason, significantly underestimated procurement costs?

—Do LCS procurement costs in the budget now include all costs that, under traditional budgeting practices, should be included? If not, what other costs are still unacknowledged?

—Have personnel or other resources from other Navy programs been used for the LCS program in any way? If so, have the costs of these personnel or other resources been fully charged to the LCS program and fully reflected in LCS program costs shown in the budget?

also includes costs for things such as Navy program-management costs and an allowance for changes—could be in excess of $400 million. The Navy did not publicly provide a precise cost overrun figure for LCS 2, but it stated that the cost overrun on LCSs 1 and 2 was somewhere between 50% and 75%, depending on the baseline that is used to measure the overrun.

The Government Accountability Office (GAO) testified in July 2007 that according to its own analysis of Navy data, the combined cost of LCSs 1 and 2 had increased from $472 million to $1,075—an increase of 128%.[22] CBO testified in July 2007 that:

> Several months ago, press reports indicated that the cost could well exceed $400 million each for the first two LCS sea frames. Recently, the Navy requested that the cost cap for the fifth and sixth sea frames be raised to $460 million, which suggests that the Navy's estimate of the acquisition cost for the first two LCSs would be around $600 million apiece....
>
> As of this writing, the Navy has not publicly released an estimate for the LCS program that incorporates the most recent cost growth, other than its request to raise the cost caps for the fifth and sixth ships. CBO estimates that with that growth included, the first two LCSs would cost about $630 million each, excluding mission modules but including outfitting, postdelivery, and various nonrecurring costs associated with the first ships of the class. As the program advances, with a settled design and higher annual rates of production, the average cost per ship is likely to decline. Excluding mission modules, the 55 LCSs in the Navy's plan would cost an average of $450 million each, CBO estimates.[23]

2008

The proposed FY2009 budget, submitted in February 2008, showed that the estimated end costs of LCS-1 and LCS-2 had increased to $531 million and $507 million, respectively (or to $631 million and $636 million, respectively, when OF/DP and FST MSSIT costs are included, or to $606 million and $582 million, respectively, when OF/DP costs are included, but FST MSSIT costs are not included).

2009

The proposed FY2010 budget, submitted in May 2009, showed that the estimated end costs of LCS-1 and LCS-2 had increased to $537 million and $575 million, respectively (or to $637 million and $704 million, respectively, when OF/DP and FST MSSIT costs are included, or to $612 million and $650 million, respectively, when OF/DP costs are included, but FST MSSIT costs are not included). CBO reported on June 9, 2008 that:

> Historical experience indicates that cost growth in the LCS program is likely. In particular, using the lead ship of the FFG-7 Oliver Hazard Perry class frigate as an analogy, historical cost-to-weight relationships indicate that the Navy's original cost target for the LCS of $260

[22] 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), pp. 4 and 22.

[23] 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, p. 18.

million in 2009 dollars (or $220 million in 2005 dollars) was optimistic. The first FFG-7 cost about $670 million in 2009 dollars to build, or about $250 million per thousand tons, including combat systems. Applying that metric to the LCS program suggests that the lead ships would cost about $600 million apiece, including the cost of one mission module. Thus, in this case, the use of a historical cost-to-weight relationship produces an estimate that is less than the actual costs of the first LCSs to date but substantially more than the Navy's original estimate.

Based on actual costs the Navy has incurred for the LCS program, CBO estimates that the first two LCSs could cost about $700 million each, including outfitting and postdelivery and various nonrecurring costs associated with first ships of a class but excluding mission modules. However, as of May 1, 2008, LCS-1 was 83 percent complete and LCS-2 was 68 percent complete. Thus, additional cost growth is possible, and CBO's estimate reflects that cost risk.

Overall, CBO estimates that the LCSs in the Navy's plan would cost about $550 million each, on average, excluding mission modules. That estimate assumes that the Navy would select one of the two existing designs and make no changes. As the program advanced with a settled design and higher annual rates of production, average ship costs would probably decline. If the Navy decided to make changes to that design, however, the costs of building future ships could be higher than CBO now estimates.[24]

Reasons for Cost Growth

Various reasons have been cited for cost growth in the LCS program, including the following:

- **Unrealistically low original estimate.** Some observers believe that the original cost estimate of $220 million for the LCS sea frame was unrealistically low. If so, a potential follow-on question would be whether the LCS represents a case of "low-balling"—using an unrealistically low cost estimate in the early stages of a proposed weapon program to help the program win approval and become an established procurement effort.
- **Impact of Naval Vessel Rules (NVR).** Navy and industry officials have attributed some of the cost growth to the impact of applying new Naval Vessel Rules (NVR)—essentially, new rules specifying the construction standards for the ship—to the LCS program. The NVR issued for the LCS program incorporated, among other things, an increase in the survivability standard (the ability to withstand damage) to which LCSs were to be built.[25] Building the ship to a higher survivability standard represented a change in requirements for the ship that led to many design changes, including changes that made ship more rugged and more complex in terms of its damage-control systems. In addition, Navy and industry officials have testified, the timing of the issuing of NVR

[24] Congressional Budget Office, *Resource Implications of the Navy's Fiscal Year 2009 Shipbuilding Plan*, June 8, 2008, pp. 26-27.

[25] The LCS was earlier conceived as a ship that would be built to a survivability standard that would be sufficient, in the event of significant battle damage, to save the ship's crew, but not necessarily the ship. The survivability standard for the LCS was increased as part of the issuing of NVR to one that would be sufficient to save not only the ship's crew, but the ship as well. (Other U.S. Navy combat ships are built to a still-higher survivability standard that is sufficient not only to save the crew and the ship, but to permit the ship to keep fighting even though it has sustained damage.)

created a situation of concurrency between design and construction in the LCS program, meaning that the ship was being designed at the same time that the shipyard was attempting to build it—a situation long known to be a potential cause of cost growth. This concurrency, Navy officials testified, was a consequence of the compressed construction schedule for the LCS program, which in turn reflected an urgency about getting LCSs into the fleet to meet critical mission demands.

- **Improperly manufactured reduction gear.** Navy and industry officials testified that cost growth on LCS-1 was partly due to a main reduction gear[26] that was incorrectly manufactured and had to be replaced, forcing a reordering of the construction sequence for the various major sections of the ship.
- **Increased costs for materials.** Some observers have attributed part of the cost growth in the program to higher-than-estimated costs for steel and other materials that are used in building the ships.
- **Emphasis on meeting schedule combined with cost-plus contract.** Some portion of cost growth on LCS-1 has been attributed to a combination of a Navy emphasis on meeting the ship's aggressive construction schedule and the Navy's use of a cost-plus contract to build the ship.[27]
- **Shipyard Performance.** Shipyard performance and supervision of the LCS shipyards by the LCS team leaders and the Navy has been cited as another cause of cost growth.[28]

[26] A ship's reduction gear is a large, heavy gear that reduces the high-speed revolutions of the ship's turbine engines to the lower-speed revolutions of its propellers.

[27] The Senate Armed Services Committee, as part of its discussion of the LCS program in its report (S.Rept. 110-77 of June 5, 2007) on the FY2008 defense authorization bill (S. 1547), stated:

> Reviewing this LCS situation will undoubtedly result in a new set of "lessons learned"' that the acquisition community will dutifully try to implement. However, the committee has previously expressed concerns about the LCS concept and the LCS acquisition strategy. The LCS situation may be more a case of "lessons lost." Long ago, we knew that we should not rush to sign a construction contract before we have solidified requirements. We also knew that the contractors will respond to incentives, and that if the incentives are focused on maintaining schedules and not on controlling cost, cost growth on a cost-plus contract should surprise no one. After the fact, everyone appears ready to agree that the original ship construction schedule for the lead ship was overly aggressive. (Page 98)

[28] A recent press report based on remarks made by Admiral Gary Roughead, the Chief of Naval Operations, included remarks on causes of cost growth in the LCS program:

> "There was a rush, and we thought we could get by with some commercial specifications," Roughead said. "As we got into building the ship, some of those commercial applications weren't going to do it from a survivability standpoint. That required some recasting of specifications."...
>
> The Navy sought to design and build the ship concurrently, "which is not necessarily a good thing," Roughead said. And in an effort to improve efficiency, the service "backed off" staffing in technical and oversight areas in the shipyards. "That came back to bite us," he said.

(Katherine McIntire Peters, "Navy's Top Officer Sees Lessons In Shipbuilding Program Failures," September 24, 2008.)

Press Reports on Shipyard Performance and Supervision

Regarding shipyard performance and supervision of the LCS shipyards by the LCS team leaders and the Navy, a February 4, 2008, press report stated:

> Marinette Marine, the Wisconsin shipyard building the first Littoral Combat Ship, never received proper certification to manage the project, which has suffered severe cost growth and schedule delays, according to an internal naval audit obtained by sister publication Inside the Pentagon [ITP].
>
> The interim report is the most damning account yet of the LCS program's failure to use earned value management (EVM). Pentagon officials and contractors are supposed to use the process to manage the cost, schedule and performance of acquisition efforts. The idea is to coordinate key project goals and objectively measure progress.
>
> In prepared testimony for his Senate confirmation hearing last October, Pentagon acquisition executive John Young noted that EVM was a "serious deficiency" in the LCS program.
>
> The audit reveals how this deficiency has undermined work on the Freedom (LCS-1), which Marinette Marine is building for Lockheed Martin.
>
> The review, which began a year ago, is still ongoing. However, ITP obtained a redacted copy of the Jan. 7 interim report, originally stamped "for official use only," through the Freedom of Information Act....
>
> The review reveals Marinette Marine's poor management and faults the Navy, the Defense Contract Management Agency (DCMA) and Lockheed for failing to notice and fix the problem.

The press report also states:

> Robert Herre, the president and general manager of Manitowoc Marine Group, which operates the shipyard, told ITP in an interview that Marinette Marine never worked on a project before that required the robust EVM needed for the Freedom contract. The management software that the shipyard acquired several years ago was not up to the task. Marinette Marine tried to adapt for the Freedom project by using a manual system, too, Herre said, but it became "more of a cumbersome process than first thought."
>
> Lockheed spokesman Craig Quigley blamed "cost and schedule baseline disconnects" on the Navy for making big changes to the Freedom without agreeing, until last November, to rebaseline both the program's cost and schedule. Previously only the schedule had been rebaselined, he said. Lockheed's team has maintained an EVM system baseline on the program and accurately reported monthly variances, he said.
>
> "Not having the cost and schedule baseline in synchronization prohibits accurate system predictions, but that was accounted for via adjunct reports," he added.
>
> The report says DCMA and Naval Sea Systems Command did not provide sufficient oversight to ensure proper management of the contract; the Navy's Gulf Coast-based shipbuilding office and industry did not effectively review the EVM, or lack thereof; and the program office and the shipyard "placed limited emphasis" on the implementation of EVM for the contract.

> DCMA initially granted a "conditional approval" for Marinette Marine's EVM system in April 2006, the report says. The conditional nod was based on a Navy-led EVM system review conducted the year before. However, Pentagon policy does not allow for a "conditional approval" of a contractor's EVM system. DCMA only recognized its error 10 months later, in February 2007, according to the report. The agency then alerted the program office, Lockheed and Marinette Marine that the "conditional approval" had been inappropriate.
>
> Now all agree Marinette Marine lacks a DCMA-validated EVM system, a problem that must be fixed.
>
> The report says Marinette Marine's EVM system did not provide valid and reliable cost, schedule, and technical performance data to support the LCS program office's decision-making. Auditors found the shipyard was not following 24 of the Pentagon's 32 EVM rules. DCMA failed to check whether the 32 rules were being followed. Further, the Navy and DCMA failed to perform formal surveillance to ensure the shipyard heeded the rules, the report says. And Marinette Marine failed to use EVM as an integrated program management tool.
>
> As a result, the Navy is "not receiving full value for program management services and information paid for under this contract," the report states.

The press report also states:

> The report describes a "significant breakdown in internal controls." Navy decision-makers are not receiving accurate and reliable earned value data for the Freedom, the review says. The shipyard's projected estimates-at-completion for the Freedom contract are "not supported." Further, the program office "did not have visibility" for project work totaling approximately $51 million. The lack of oversight left the Navy's financial interest in the ship's construction unprotected, the review concludes....
>
> Auditors recommended eight fixes. The report says four remain to be done, but Quigley said two remain to be done. Last November, the Navy completed a new estimate for the cost of completing the Freedom contract, conducted a schedule review and had the program develop a new baseline for the ship. Officials have also had Lockheed start work on a plan to fix the problems.
>
> Quigley said officials have reviewed, approved and monitored Lockheed's plan. He also said the shipyard's efforts are now being checked continuously against the 32 rules.
>
> In March [2008], the Navy plans to review the new baseline. And DCMA is due to conduct a review to ensure the shipyard is following the rules by year's end, the report says. Quigley said that last step could take 18 months.
>
> Unlike Marinette Marine, Lockheed and Gibbs & Cox (another team member), have EVM certification, he said.
>
> Young's predecessor, Kenneth Krieg, warned in a memo last summer that the Pentagon's EVM efforts were "insufficient, especially given the number of major defense programs experiencing execution problems."[29]

[29] Christopher J. Castelli, "Audit Exposes Failed Management of Troubled Littoral Warship," *Inside the Navy*, February 4, 2008.

A July 14, 2008, press report states:

> The Navy's Littoral Combat Ship program has not one, but two black eyes on earned value management because both LCS shipbuilders violated Defense Department rules for managing the cost, schedule and performance of acquisition efforts, a new audit finds.
>
> The June 12 report by the Naval Audit Service reveals that Austal, General Dynamics and the Navy all failed to apply the rules to the second Littoral Combat Ship, Independence (LCS-2). The report is stamped "for official use only." *Inside the Pentagon* obtained a redacted version through the Freedom of Information Act.
>
> This finding is nearly as bad as the failure of Marinette Marine, Lockheed Martin and the Navy to apply the rules to the first LCS, Freedom (LCS-1), a debacle documented by auditors earlier this year. In that case, Marinette Marine ran afoul of more rules and also lacked the required management certification.
>
> The idea behind earned value management is to coordinate key project goals and objectively measure progress. Many Pentagon contractors and programs have failed to use the tool properly. But the failures in the LCS program are particularly well documented, providing a road map for how not to do earned value management.
>
> The latest audit—conducted from February 2007 to April 2008—reveals Alabama-based Austal, the shipyard building LCS-2 for prime contractor General Dynamics, failed to heed 20 of the Pentagon's 32 rules for earned value management.
>
> GD spokesman Jim DeMartini said the company had not yet reviewed the June 12 report.
>
> "However, we are aware of the issue and we are aggressively taking actions to improve the implementation and oversight of EVM in the LCS program," he told ITP. "We are working in close cooperation with our Navy customer and have achieved a number of noteworthy accomplishments along the path to improving the implementation of EVM in the LCS program."
>
> GD intends to "continue to aggressively address these issues until they are resolved, and to execute the established processes and procedures for the duration of the LCS program," DeMartini said....
>
> "We found that EVM was not sufficiently implemented and overseen by any of the responsible parties on the LCS-2 'Independence' detailed design and construction contract," the report states.
>
> The audit warns the Navy's supervisor at GD's Bath Iron Works shipyard did not provide adequate surveillance over Austal's EVM implementation.
>
> GD, as the prime contractor, did not effectively oversee Austal's EVM implementation, auditors write.
>
> And the Navy's program executive office for ships, as well as the program manager, lacked adequate visibility over the LCS contractor's cost, schedule, and technical performance because they "placed limited emphasis on the implementation of EVM," the report says.
>
> The report faults the Defense Contract Management Agency and Naval Sea Systems Command for insufficient oversight that failed to ensure EVM was properly implemented for

LCS-2. The Defense Contract Audit Agency did not perform the required audits of Austal's earned value management system, the report adds.

"The Navy is committed to earned value management and is working proactively to ensure that it is implemented properly," Navy spokesman Lt. Clay Doss told ITP. "We asked the Naval Audit Service to independently review how EVM was being used on the Littoral Combat Ship program in order to provide a baseline for continuous self-assessment. We are in the process of taking the corrective actions as recommended in the report."

The report's recommendations aim to bring Austal into compliance with the 32 rules, provide better oversight and ensure required audits are conducted.

The audit also critiques the work of the Navy's LCS program management assist group (PMAG), which studied the cost growth on the first LCS and the projected costs for three more LCSs in early 2007. Though the PMAG answered all nine questions regarding cost estimates, cost growth, contractor and subcontractor arrangement, EVM, and oversight issues, the review was "not comprehensive," the audit finds, noting the PMAG was given less than 15 working days to do its study.

"Given the complexity of the ship design and construction process, use of multiple contractors, geographical dispersion of the key players, and the size of the LCS acquisition program, we believe 15 days was not sufficient time to adequately conduct in-depth analyses to fully assess the validity and accuracy of program data and decisions used to support their findings," the report says.[30]

July 2007 GAO Testimony

GAO testified in July 2007 that:

> We have frequently reported on the wisdom of using a solid, executable business case before committing resources to a new product development effort....
>
> A sound business case would establish and resource a knowledge-based approach at the outset of a program. We would define such a business case as firm requirements, mature technologies, and an acquisition strategy that provides sufficient time and money for design activities before construction start. The business case is the essential first step in any acquisition program that sets the stage for the remaining stages of a program, namely the business or contracting arrangements and actual execution or performance. If the business case is not sound, the contract will not correct the problem and execution will be subpar. This does not mean that all potential problems can be eliminated and perfection achieved, but rather that sound business cases can get the Navy better shipbuilding outcomes and better return on investment. If any one element of the business case is weak, problems can be expected in construction. The need to meet schedule is one of the main reasons why programs cannot execute their business cases. This pattern was clearly evident in both the LPD 17 [amphibious ship] and LCS programs. In both cases, the program pushed ahead with production even when design problems arose or key equipment was not available when needed. Short cuts, such as doing technology development concurrently with design and construction, are taken to meet schedule. In the end, problems occur that cannot be resolved

[30] Christopher J. Castelli, "Audit Reveals Both LCS and Industry Teams Violated Management Rules," *Inside the Pentagon*, July 10, 2008. The article was reprinted in essentially identical form, with the same headline, in the July 14, 2008, issue of sister publication *Inside the Navy*.

> within compressed, optimistic schedules. Ultimately, when a schedule is set that cannot accommodate program scope, delivering an initial capability is delayed and higher costs are incurred....
>
> What happens when the elements of a solid business case are not present? Unfortunately, the results have been all too visible in the LPD 17 and the LCS. Ship construction in these programs has been hampered throughout by design instability and program management challenges that can be traced back to flawed business cases. The Navy moved forward with ambitious schedules for constructing LPD 17 and LCS 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....
>
> In the LCS program, design instability resulted from a flawed business case as well as changes to Navy requirements. From the outset, the Navy sought to concurrently design and construct two lead ships in the LCS program in an effort to rapidly meet pressing needs in the mine countermeasures, antisubmarine warfare, and surface warfare mission areas. The Navy believed it could manage this approach, even with little margin for error, because it considered each LCS to be an adaptation of an existing high-speed ferry design. It has since been realized that transforming a high-speed ferry into a capable, networked, survivable warship was quite a complex venture. Implementation of new Naval Vessel Rules (design guidelines) further complicated the Navy's concurrent design-build strategy for LCS. These rules required program officials to redesign major elements of each LCS design to meet enhanced survivability requirements, even after construction had begun on the first ship. While these requirements changes improved the robustness of LCS designs, they contributed to out of sequence work and rework on the lead ships. The Navy failed to fully account for these changes when establishing its $220 million cost target and 2-year construction cycle for the lead ships.
>
> Complicating LCS construction was a compressed and aggressive schedule. When design standards were clarified with the issuance of Naval Vessel Rules and major equipment deliveries were delayed (e.g., main reduction gears), adjustments to the schedule were not made. Instead, with the first LCS, the Navy and shipbuilder continued to focus on achieving the planned schedule, accepting the higher costs associated with out of sequence work and rework. This approach enabled the Navy to achieve its planned launch date for the first Littoral Combat Ship, but required it to sacrifice its desired level of outfitting. Program officials report that schedule pressures also drove low outfitting levels on the second Littoral Combat Ship design as well, although rework requirements have been less intensive to date. However, because remaining work on the first two ships will now have to be completed out-of-sequence, the initial schedule gains most likely will be offset by increased labor hours to finish these ships.

The difficulties and costs discussed above relate to the LCS seaframe only. This program is unique in that the ship's mission equipment is being developed and funded separately from the seaframe. The Navy faces additional challenges integrating mission packages with the ships, which could further increase costs and delay delivery of new antisubmarine warfare, mine countermeasures, and surface warfare capabilities to the fleet. These mission packages are required to meet a weight requirement of 180 metric tons or less and require 35 personnel or less to operate them. However, the Navy estimates that the mine countermeasures mission package may require an additional 13 metric tons of weight and seven more operator personnel in order to deploy the full level of promised capability. Because neither of the competing ship designs can

accommodate these increases, the Navy may be forced to reevaluate its planned capabilities for LCS.[31]

[31] 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), pp. 8-11.

Appendix B. 2007 Program Restructuring and Ship Cancellations

The Navy substantially restructured the LCS program in 2007 in response to significant cost growth and delays in constructing the first LCS sea frames. This restructuring led to the cancellation of four LCSs that were funded in FY2006 and FY2007. A fifth LCS, funded in FY2008, was cancelled in 2008. This appendix presents the details of the program restructuring and ship cancellations.

2007 Program Restructuring

March 2007 Navy Restructuring Plan

In response to significant cost growth and schedule delays in the building of the first LCSs that first came to light in January 2007 (see next section), the Navy in March 2007 announced a plan for restructuring the LCS program that:

- canceled the two LCSs funded in FY2007 and redirected the funding for those two ships to pay for cost overruns on earlier LCSs;
- announced an intention to lift a 90-day stop-work order that the Navy had placed on LCS-3 in January 2007—provided that the Navy reached an agreement with the Lockheed-led industry team by April 12, 2007, to restructure the contract for building LCSs 1 and 3 from a cost-plus type contract into a fixed price incentive (FPI)-type contract—or terminate construction of LCS-3 if an agreement on a restructured contract could not be reached with the Lockheed team by April 12, 2007;
- announced an intention to seek to restructure the contract with the General Dynamics-led industry team for building LCSs 2 and 4 into an FPI-type contract—if LCSs 2 and 4 experienced cost growth comparable to that of LCSs 1 and 3—and, if such a restructuring were sought, terminate construction of LCS-4 if an agreement on a restructured contract for LCS-2 and LCS-4 could not be reached;
- reduced the number of LCSs requested for FY2008 from three to two (for the same requested FY2008 procurement funding of $910.5 million), and the number to be requested for FY2009 from six to three; and
- announced an intention to conduct an operational evaluation to select a favored design for the LCS that would be procured in FY2010 and subsequent years, and to conduct a full and open follow-on competition among bidders for the right to build that design.[32]

[32] Source: Navy briefing to CRS and Congressional Budget Office (CBO) on Navy's proposed LCS program restructuring plan, March 21, 2007.

April 2007 Termination of LCS-3

On April 12, 2007, the Navy announced that it had not reached an agreement with Lockheed on a restructured FPI-type contract for LCS-1 and LCS-3, and consequently was terminating construction of LCS-3.[33] (The Navy subsequently began referring to the ship as having been partially terminated—a reference to the fact that Lockheed was allowed to continue procuring certain components for LCS-3, so that a complete set of these components would be on hand to be incorporated into the next LCS built to the Lockheed design.) (The designation LCS-3 is now being reused to refer to one of the two LCSs procured in FY2009.)

November 2007 Termination of LCS-4

In late September 2007, it was reported that the Navy on September 19 had sent a letter to General Dynamics to initiate negotiations on restructuring the contract for building LCSs 2 and 4 into an FPI-type contract. The negotiations reportedly were to be completed by October 19, 2007—30 days from September 19.[34] On November 1, 2007, the Navy announced that it had not reached an agreement with General Dynamics on a restructured FPI-type contract for LCS-2 and LCS-4, and consequently was terminating construction of LCS-4.[35] (The designation LCS-4 is now being reused to refer to one of the two LCSs procured in FY2009.)

Cancellation of Prior-Year Ships

Table B-1 below summarizes the status of the nine LCSs funded by Congress from FY2005 through FY2009. As shown in the table, of the nine ships, five were later canceled, leaving four ships in place through FY2009—LCSs 1 and 2, and the two LCSs funded in FY2009. Ship designations LCS-3 and LCS-4 are being reused as the designations for the two ships funded in FY2009.

Table B-1. Status of LCSs Funded in FY2005-FY2009

Ships funded	FY funded	Navy hull designation	Status
1st	2005	LCS-1	**Commissioned into service** on November 8, 2008.
2nd	2006	LCS-2	**Under construction**; ship launched April 26, 2008 and scheduled to be delivered to the Navy in late-2009.
3rd		LCS-3 (not the same ship as LCS-3 below)	**Canceled by Navy** in April 2007 after being placed under contract due to inability to come to agreement with contractor on revised (fixed-price) contract terms for LCSs 1 and 3.

[33] Department of Defense News Release No. 422-07, April 12, 2007, "Navy Terminates Littoral Combat Ship 3."

[34] Geoff Fein, "Navy Seeking To Negotiate FPI Contract With General Dynamics," *Defense Daily*, September 24, 2007; Geoff Fein, "Navy, General Dynamics Meet To Discuss New LCS Fixed Price Structure," *Defense Daily*, September 27, 2007; Tony Capaccio, "General Dynamics Urged To Take Fixed Price On Warship Contract," *Bloomberg News*, September 28, 2007; Jason Sherman, "Navy, General Dynamics Discuss Fixed-Price Contract For LCS," *Inside the Navy*, October 1, 2007.

[35] Department of Defense News Release No. 1269-07, November 1, 2007, "Navy Terminates Littoral Combat Ship (LCS 4) Contract."

Ships funded	FY funded	Navy hull designation	Status
4th		LCS-4 (not the same ship as LCS-4 below)	**Canceled by Navy** in November 2007 after being placed under contract due to inability to come to agreement with contractor on revised (fixed-price) contract terms for LCSs 2 and 4.
5th	2007	none (ship canceled before being placed under contract)	**Canceled by Navy** in March 2007 before being placed under contract as part of Navy's LCS program restructuring; funds reapplied to cover other program costs.
6th		none (ship canceled before being placed under contract)	**Canceled by Navy** in March 2007 before being placed under contract as part of Navy's LCS program restructuring; funds reapplied to cover other program costs.
7th	2008	LCS-5 (for a while, at least, although the ship was canceled before being placed under contract)	**Canceled by Navy following Congress's decision** in September 2008, as part of its action on the FY2009 defense appropriations bill, to rescind the funding for the ship.
8th	2009	LCS-3 (not the same ship as LCS-3 above; the ship designation is being reused)	**Funded in FY2009 and Under Construction.** Contract to build the ship awarded to Lockheed Martin on March 23, 2009. Ship is currently under construction.
9th		LCS-4 (not the same ship as LCS-4 above; the ship designation is being reused)	**Funded in FY2009 and Under Construction.** Contract to build the ship awarded to General Dynamics on May 1, 2009. Ship is currently under construction.

Source: Prepared by CRS.

Appendix C. Summary of Congressional Action in FY2005-FY2009

This appendix presents a summary of congressional action on the LCS program in FY2005-FY2009.

FY2005

In FY2005, Congress approved the Navy's plan to fund the construction of the first two LCS sea frames using research and development funds rather than shipbuilding funds, funded the first construction cost of the first LCS (LCS-1), required the second LCS (LCS-2) to be built (when funded in FY2006) to a different design from the first, prohibited the Navy from requesting funds in FY2006 to build a third LCS, and required all LCSs built after the lead ships of each design to be funded in the SCN account rather than the Navy's research and development account.

FY2006

In FY2006, Congress funded the procurement of LCSs 2, 3, and 4. (The Navy requested one LCS for FY2006, consistent with Congress's FY2005 action. Congress funded that ship and provided funding for two additional ships.) Congress in FY2006 also established a unit procurement cost limit on the fifth and sixth LCS sea frames of $220 million per ship, plus adjustments for inflation and other factors (Section 124 of the FY2006 defense authorization bill [H.R. 1815/P.L. 109-163] of January 6, 2006), required an annual report on LCS mission packages, and made procurement of more than four LCSs contingent on the Navy certifying that there exists a stable design for the LCS.

FY2007

In FY2007, Congress funded the procurement of LCSs 5 and 6. (The Navy canceled these two ships in 2007 before they were placed under contract for construction.)

FY2008

In FY2008, Congress accepted the Navy's cancellation of LCSs 3 through 6; funded the procurement one additional LCS in FY2008 (which the Navy called LCS-5);[36] significantly reduced the Navy's FY2008 funding request for the LCS program; amended the LCS sea frame unit procurement cost cap to $460 million per ship for LCSs procured in FY2008 and subsequent years (Section 125 of the conference report [H.Rept. 110-477 of December 6, 2007] on H.R. 1585, the FY2008 defense authorization bill, which was enacted as H.R. 4986/P.L. 110-181 of

[36] The Navy apparently called this ship LCS-5 because the original LCS-5 and LCS-6 were canceled by the Navy before they were replaced under contract, leaving LCS-4 as last LCS under contract to have been canceled. In spite of its designation, LCS-5 would have been the third LCS in the restructured LCS program, and was the seventh to have been funded by Congress.

January 28, 2008); and required the Navy to use fixed-price-type contracts for the construction of LCSs procured in FY2008 and subsequent years.

The Navy in 2007 requested that Congress amend the existing unit procurement cost cap for the fifth and sixth ships to $460 million, plus adjustments for inflation and other factors. Congress amended the cost cap to $460 million, but applied it not only to the fifth and sixth LCSs, but to all LCSs procured in FY2008 and subsequent years. The use of fixed-price contracts for future LCSs was something that the Navy had stated an intention to do as part of its plan for restructuring the LCS program.

FY2009

In FY2009, Congress delayed the implementation of the LCS sea frame unit procurement cost cap by two years, to ships procured in FY2010 and subsequent years (Section 122 of the FY2009 defense authorization bill [S. 3001/P.L. 110-417 of October 14, 2008]); rescinded $337 million in FY2008 shipbuilding funds for the LCS program, effectively canceling the funding for the LCS procured in FY2008 (Section 8042 of the FY2009 defense appropriations bill [Division C of H.R. 2638/P.L. 110-329 of September 30, 2008]); and funded the procurement of two LCSs at a cost of $1,020 million.

Appendix D. March 2009 Navy Testimony on LCS Program

On March 10, 2009, the Seapower and Expeditionary Forces subcommittee of the House Armed Services Committee held a hearing to review the status of the LCS program. Reprinted below is the full text of the Navy's prepared statement for the hearing.[37]

INTRODUCTION / REQUIREMENT

Mr. Chairman, distinguished members of the Subcommittee, thank you for the opportunity to appear before you today to address the Navy's Littoral Combat Ship (LCS) program. We thank the Committee for its continued support and active interest in Navy shipbuilding programs.

The Navy remains committed to the LCS program. LCS fills warfighting gaps in support of maintaining dominance in the littorals and strategic choke points around the world. The Navy remains committed to procuring 55 LCSs, and is aggressively pursuing cost reduction measures to ensure delivery of future ships on a schedule that affordably paces evolving threats. This will be accomplished by matching required capabilities, to a recurring review of warfighting requirements through applying lessons learned from the construction and test and evaluation periods of seaframes and mission packages.

The LCS program is structured in flights of seaframes and spirals of mission packages. This allows the relatively rapid change in technologies and threats associated with the modular mission packages to be continuously improved through incremental upgrades without major design impacts to seaframes. The result is a program that minimizes the risks of a highly interdependent system of systems by decoupling seaframe procurement from mission package procurement. This allows continuous cost efficient delivery of state-of-the-art capability to the warfighter via new mission package upgrades.

The LCS program capabilities address specific and validated capability gaps in Mine Countermeasures (MCM), Surface Warfare (SUW) and Anti-Submarine Warfare (ASW). The Concept of Operations and design specifications for LCS were developed to meet these gaps with focused mission packages that deploy manned and unmanned vehicles to execute a variety of missions. LCS's inherent characteristics (speed, agility, shallow draft, payload capacity, reconfigurable mission spaces, air/water craft capabilities) combined with its core Command, Control, Communications, Computers and Intelligence (C4I), sensors, and weapons systems, make it an ideal platform for hosting additional Maritime Strategy mission areas, such as Irregular Warfare and Maritime Security Operations.

The Navy, as part of its annual review of its shipbuilding program, expects there will be sufficient force structure with our existing frigates and mine warfare ships until LCS delivers in quantity to meet overarching deployment requirements.

[37] Statement of RADM Victor Guillory, U.S. Navy Director of Surface Warfare, and RADM William E. Landay, III, Program Executive Officer Ships, and Ms. E. Anne Sandel, Program Executive Officer Littoral and Mine Warfare, before the Subcommittee on Seapower and Expeditionary Forces of the House Armed Services Committee [hearing] on the Current Status of the Littoral Combat Ship Program, March 10, 2009. 11 pp. (including the cover as page 1).

Legacy mine warfare ships and frigates are planned to be phased out gradually. These decommissionings will be balanced with LCS mission package and seaframe deliveries to mitigate warfare risks.

LCS 1, USS FREEDOM, was delivered to the Fleet on September 18, 2008—six years and one day after the program was established. LCS 2, the future USS INDEPENDENCE, was christened in Mobile, AL, on October 4, 2008. Later this year the program will have delivered a second ship of a completely different design.

While the initial cost and schedule objectives for the program were overaggressive, they did provide the tension and urgency for these achievements. Although the concurrent design and construction of LCS revealed challenges for meeting the original cost and schedule objectives, the Navy will apply lessons learned to this program as well as other shipbuilding programs.

At the Subcommittee's request, the Navy is pleased today to discuss an overview of the history of the LCS program, the current status of LCS 1 and LCS 2, and the future acquisition strategy for the LCS program.

BACKGROUND

The LCS acquisition strategy, approved in May 2004, was based on the tenets of modular and open system architecture, Cost-As-an-Independent-Variable design process, a rapid construction cycle and continuous competition at all levels of the program. The Navy awarded contracts for construction of the first four LCS seaframes, with Lockheed Martin (LM) and General Dynamics (GD) awarded two ships each. Fabrication of LCS 1, the first LM ship, began in February 2005 and the ships delivered in September 2008. Fabrication on LCS 2 , the first GD ship, began in November 2005 and this ship will deliver this year. LCS 3 and 4 options were exercised in June and December 2006, respectively.

Cost growth on both variants resulted in a detailed assessment of program cost and structure. The Navy sought to restructure the contracts for LCS 3 and 4 to fixed-price incentive terms to more equitably balance cost and risk, but could not come to terms and conditions that were acceptable to both parties. On April 12, 2007, the Navy terminated construction of LCS 3 for convenience under the Termination clause of the contract. On November 1, 2007, the Navy terminated construction of LCS 4 for convenience under the Termination clause of the contract. Based on program restructuring, the Navy requested and received congressional approval to reprogram FY 2007 shipbuilding appropriations to fund cost increases on LCS 1 and 2.

At the direction of Assistant Secretary of the Navy for Research, Development, and Acquisition (ASN(RDA)), the LCS program underwent a thorough independent assessment to review the cause of the cost growth and evaluate the way forward.

The results of that assessment identified a number of factors key to the program's poor performance. The Navy has actively addressed those key findings in the program as it operates today:

— The design for both ships is mature and we are incorporating revisions to specific areas based on the lessons learned from the construction of the initial ships, proposed production improvements, acceptance inspections and the early stages of the post delivery testing period. Those revisions will be in place for the start of construction of the FY 2009 ships.

— The Navy has increased the staff assigned in the program office and at the shipyards to monitor performance. The program office staff has grown from eight to 20 civilian personnel, focusing on critical production, acquisition, and financial management specialties. An additional 12 billets have been assigned as the two lead ships complete delivery and post delivery milestones this year and more ships are placed under contract. Military staff has increased from three to five assigned. Officers with new ship construction experience were assigned to the program manager and production manager positions.

— The Supervisors of Shipbuilding doubled the staff at each LCS shipbuilder. Focusing resources to the waterfront, the program office works closely with the Supervisors to sustain a daily drumbeat in monitoring production progress on these lead ships, identifying and monitoring key metrics that maintain progress to key events.

— To improve technical decision making and reduce the time to resolve technical issues, especially as related to the application of Naval Vessel Rules, the program office and the Naval Sea Systems Command Chief Engineer have placed senior managers and technical authorities on the waterfront.

— New performance baselines were implemented for each contract to help monitor and control cost, with contracting incentive structures to support improved progress. We continue to work closely with the industry teams to improve their performance and Earned Value Management System measurement and reporting capabilities.

— The FY 2009 and FY 2010 contracts will be fixed-price contracts to ensure cost and schedule adherence remain a primary focus of both the industry and the government program teams.

AFFORDABILITY

The Navy has implemented a comprehensive cost-reduction program for LCS. Taking advantage of lessons from other shipbuilding programs' affordability initiatives such as the DDG 51 value engineering program, the T-AKE "take cost" program and the Virginia-class cost-reduction initiative, this ongoing effort seeks to reduce acquisition cost and total ownership cost through continuous assessment of operational and technical requirements, improvement of production processes, and implementation of acquisition strategies that will lead to stable production and improved purchasing leverage. Examples of areas under review by this program include:

— A joint team of industry, government and independent experts have conducted a "stem-to-stern" inspection of each ship to identify areas of inefficiency or where alternative production methods can improve production efficiencies.

— The Navy implemented a Total Ownership Cost (TOC) reduction review jointly overseen by the ASN(RDA) and Vice Chief Naval Operations to look for improvements in total lifecycle costs.

— The Navy has initiated a second study to look at the Total Ownership Cost return on investment of a common combat system. The initial study conducted in 2007 did not support a payback sufficient to support the upfront integration and additional procurement costs. The Navy's development of its objective architecture for combat systems provided a different set of assumptions to be considered for this new study.

— Finally, infrastructure improvements are either under review or in progress at both yards that will improve production efficiencies and reduce costs.

CURRENT STATUS OF LCS 1 AND LCS 2

USS FREEDOM (LCS 1)

USS FREEDOM was built by the Lockheed Martin-led team at the Marinette Marine shipyard in Marinette, WI, and was commissioned on November 8, 2008. Due to restrictions on some testing in the Great Lakes, acceptance testing was broken into two phases. Acceptance Trial 1 (AT) evaluated the ship, propulsion, navigation and some communications. Acceptance Trial 2 will evaluate the remaining communications and most of the combat systems. In August 2008, the Navy's Board of Inspection and Survey (INSURV) conducted Acceptance Trial 1 on LCS 1 and found the ship to be "capable, well-built, and inspection-ready," and recommended that the Chief of Naval Operations authorize delivery of the ship following the correction or waiver of cited material deficiencies, a standard practice in Navy shipbuilding.

During inspection, INSURV identified 21 "starred" deficiencies onboard LCS 1. This is a relatively low number and compares favorably to other first-of-class ships. The Navy developed a plan to address these deficiencies in a timely, prioritized sequence – 12 were closed prior to delivery, five more will be closed during the ship's current Industrial Post Delivery Availability, and the final four will be closed during Post Shakedown Availability (PSA) in FY 2010.

After acceptance, the crew conducted a vigorous shakedown of the ship during her transit from the building yard to Norfolk, VA. Encountering adverse weather and numerous instances of challenging ship handling evolutions, the crew reported the ship performed superbly during the 2,400 mile journey. LCS 1 will undergo AT 2 and additional test and trials period intended to complete certifications and mission package integration testing.

INDEPENDENCE (LCS 2)

INDEPENDENCE is being built by the General Dynamics team at the Austal USA shipyard in Mobile, AL. She was christened on October 4, 2008, and is expected to deliver in 2009, with Initial Builder's Trials and Acceptance Trials to complete prior to ship delivery. Following delivery and commissioning, LCS 2 will transit to Norfolk, VA, and conduct a post delivery test and trials period similar to FREEDOM.

Facing similar lead ship challenges on INDEPENDENCE, Navy leadership directed General Dynamics to take a phased approach to completing the ship. The initial phase prioritized efforts on that scope of work required to safely take INDEPENDENCE to sea, demonstrating propulsion and additional systems and components necessary for communications and safe navigation. Based on performance to this goal, a second phase of work would be authorized focusing on only those core combat systems necessary to demonstrate a basic detect-to-engage capability required during an acceptance trial. The third phase is the remaining systems and components required to demonstrate complete combat systems and communications capabilities of the complete sea frame. At this time, the program manager has authorized phase 1 and 2 work. Phase 3 remains contingent on performance of the first two phases. It is still the program manager's intention to present a complete ship to INSURV at acceptance trial.

The Navy monitors progress through daily assessments, weekly analysis of key metrics on production and test progress, and conducts monthly progress and cost reviews with the contractor to ensure that corrective actions are implemented and effective. As of February

2009, all four of the ship's generators have been started and vital shipboard electrical systems have completed initial testing, aligning with current schedule projections for ship delivery. The program expects to achieve main propulsion engines light-off in April and May, with a goal of Builder's Trials in late June. The program is prudently managing resources to be able to address any potential challenges.

Status of Mission Package Procurement

The modular open system architecture used for the LCS design allows independent development of seaframes and mission packages that integrate across a controlled interface specification to ensure complete interoperability. This allows the relatively rapid change in technologies associated with the modular mission packages (MPs) to be continuously improved through incremental upgrades without major design impacts to seaframes. The result is a program that minimizes the risks of a highly interdependent system of systems by decoupling seaframe procurement from mission package procurement, and allows continous cost efficient delivery of state-of-the-art capability to the warfighter via new misison package upgrades.

The underlying strength of the LCS lies in its innovative design approach, applying modularity for operational flexibility. Fundamental to this approach is the capability to rapidly install interchangeable mission packages into the seaframe. The ability to modify the LCS physical configuration with different MPs in less than a 96-hour period gives the operational commander a uniquely flexible response to changing theater warfighting requirements. This also allows the LCS warfighting capability to quickly adapt to evolving threats, using improved technology. To achieve this flexibility, the Navy is developing and procuring specific numbers of MPs to meet the Fleet's warfighting requirements. A mission package consists of mission systems which are integrated to form mission modules, Sailors organized into mission module and aviation crew detachments and supporting aircraft. Each mission package provides warfighting capability for one of three focused mission areas:

— Mine Countermeasures (MCM)

— Surface Warfare (SUW)

— Anti-Submarine Warfare (ASW)

The first SUW and ASW mission packages were rolled out in FY 2008 and joined the first MCM mission package, which was delivered in FY 2007. Land-based and at-sea testing of mission package components began in FY 2008 and continues in FY 2009. Through an Integrated Test and Evaluation framework, the LCS Mission Modules program office is working very closely with the responsible mission systems program offices in Naval Sea Systems Command, Naval Air Systems Command and the Army to ensure that all Mission System Program of Record, as well as LCS shipboard testing events, demonstrates required warfighting effectiveness and suitability. Formal LCS sea frame testing of mission packages commences in FY 2009 and continues through FY 2012.

The LCS Mission Modules program office has adopted an open business model that leverages Participating Acquisition Resource Managers' (PARMs) developmental efforts for both program-of-record and non-program-of-record systems and components. This process minimizes LCS Mission Modules program investments of research and development dollars required to mature unique technologies. In addition, the process allows for package procurement flexibility by limiting integration of immature technologies/systems. This is done by continuous evaluation of system maturity through a disciplined system engineering framework. Through this open business model, the LCS Mission Modules program procures

mature mission systems from PARMs and then engages an industry partner for Package Production and Assembly (PP&A) of mission packages.

FUTURE ACQUISITION STRATEGY FOR THE LCS PROGRAM

LCS Acquisition Strategy

In October 2008, the Undersecretary of Defense for Acquisition, Technology and Logistics (USD(AT&L)) approved a revised acquisition strategy for LCS to cover procurement of the FY 2009 and FY 2010 ships. The updated acquisition strategy combines the FY 2009 procurement and FY 2010 options in order to maximize competitive pressure on pricing as a key element of cost control. Increasing the quantity solicited by adding the FY 2010 ships to the FY 2009 solicitation as options will also enable industry to better establish longer term supplier relationships and offer the potential for discounting to the prime contractors and subcontractors. FY 2010 ship options will be a competition for quantity.

Acquisition strategies for FY 2011 and outyear ships are under development. The Navy's strategy will be guided by cost and performance of the respective designs, as well as options for sustaining competition throughout the life of the program. Evaluations of combat systems and hull, mechanical and electrical (HM&E) performance will be conducted throughout those tests and trial periods and, as was mentioned earlier, we are already looking for opportunities to reduce total ownership costs through commonality, reductions or consolidations based on return-on-investment analysis.

FY 2009 and FY 2010 Contract Awards

As a result of congressional direction contained in the FY 2009 Defense Appropriations Act, the Navy amended the LCS seaframe construction solicitation to delete the FY 2008 ship. This amended solicitation continues the competition between the two incumbent industry teams. The Navy may award one ship to each industry team in FY 2009 and intends to hold a competition for the FY 2010 option ships soon after award of the FY 2009 contracts. Affordability remains a key tenet of the LCS program as the Navy works with industry to provide this capability for the lowest cost.

The FY 2009 and FY 2010 awards will be fixed-price incentive contracts, with the Navy anticipating that each LCS prime contractor receives one ship in FY 2009. The Navy remains committed to effective cost control and has modified contracting strategies and management practices to provide program stability. The FY 2009 and FY 2010 ships will be designated as Flight 0+ and will include only existing approved engineering changes along with improvements to construction or fabrication procedures. The Navy will incorporate further lessons learned from LCS 1 and 2 sea trials into the FY 2009 and FY 2010 ships prior to production. Any such changes will be limited to those essential for safety, operability or affordability. Furthermore, the RFP requests that the proposals for the FY 2010 option ships include alternative prices for both a full-up ship and separately priced contract line item numbers (CLINs) for a core seaframe (only systems for safe operation at sea), core combat system and individual combat systems and equipments (such as the gun or radar). This allows us the opportunity to manage the integration of the combat systems separately if that proved to be more affordable.

In the interim prior to FY 2009 contract awards, both industry teams were authorized and funded to pursue limited design and construction efforts while source selection proceeded. The scope of these efforts was carefully coordinated with prime contractors with an eye on preserving critical shipbuilding skills or to improve production process engineering. Once the FY 2009 ships are awarded, these sustaining efforts will be subsumed in the shipbuilding contracts.

Mission Modules Acquisition Strategy

At the time of its inception in FY 2004, the Mission Modules program office decided to utilize government labs to build the first two of each type of mission package. The Navy Labs (Naval Surface Warfare Center Panama City (NSWC PC), Naval Undersea Warfare Center Newport (NUWC NPT), SPAWAR Systems Center San Diego (SSC SD) and Naval Surface Warfare Center Dahlgren (NSWC DD)) are developing, integrating, testing and delivering the first six mission packages. This approach was implemented to ensure responsiveness to refined requirements and reduce the financial risk to the Navy associated with cost-type contracts for this unique concept. This strategy has been very advantageous to the Mission Modules program. Once these initial mission packages are completed by the warfare centers, the package production and assembly will transition to Northrop Grumman.

Following a competitive solicitation, Northrop Grumman was awarded a contract in January 2006 to provide a range of package production and assembly functions specified by the Navy. The contract contains Award Fee/Award Term provisions covering a term of up to ten years, with contract options exercised annually. Awarding the options is contingent on continued excellent contractor performance in preceding years, and is assessed annually.

As Northrop Grumman steps into a production and assembly role, the Navy labs will transition into the Technical Direction Agent and In-Service Engineering Agent role. This transition began in 2008 with the transfer of the Technical Data Packages from the Navy labs to Northrop Grumman in 2008 and continues in 2009.

Rights in Technical Data and Computer Software

It is the Navy's legal and contractual position that the Navy has Government Purpose Rights (GPR) to the seaframe designs of both LCS variants and, as such, can solicit full and open competition for either seaframe design after an adequate design package for such a competition is developed.

For clarity, those rights are as follows:

— Seaframe – The government has GPR to the design of both seaframes. We did not seek the rights to the individual equipments in the seaframe (for example we do not have GPR to the Rolls Royce engine that we could provide to another engine manufacturer to produce for the government). Another shipbuilder or the government would have to contract with the individual equipment manufacturers for fabrication and delivery of the equipment for shipboard installation or, alternatively, negotiate a license with the individual equipment manufacturers based on the equipment, specifications and interfaces detailed in the seaframe design.

— Combat Systems – We have GPR to the technical data pertaining to the LM combat systems, architecture and interfaces. It currently resides in our shared repository. The GD Integrated Combat Management Systems (ICMS) is based on the Thales TACTICOS system for which Northrop Grumman is the sole U.S. licensee. Another shipbuilder or the government would have to either enter into a contract with Northrop Grumman for production and delivery of the ICMS or, alternatively, obtain a license for that system from Northrop Grumman. As with the seaframe, we do not possess GPR to the specific equipments for either system such as the gun, electronic warfare system or radar.

Any third parties seeking to compete on LCS would need to either contract directly with the equipment manufacturers for fabrication and delivery of the required equipment and associated software or, alternatively, negotiate licensing agreements for the equipment and software with the respective vendors. This is similar to the current approach in place with the

LM and GD teams. An alternative approach would be for the government to contract directly with the equipment manufacturers and provide the equipment and software to the shipbuilder as Government Furnished Equipment/Government Furnished Information.

LCS "Build-to-Print" Design Concept

To implement a competitive "build-to-print" seaframe acquisition, there remains a significant effort to finalize those revisions to the design that have resulted during construction, as well as lessons learned from LCS Flight 0 production improvement initiatives, developmental/ operational testing and at-sea testing. There is a considerable amount of work necessary to convert a design package developed by a specific shipyard based on its own particular production capabilities and processes to one that can be provided to another qualified shipbuilder as a government furnished design.

The amount of effort necessary to prepare the LCS data packages to support a full and open competition derives from the structure of the initial LCS acquisition strategy. The foundation of the LCS procurement is not a traditional detailed drawing package but the Navy-established requirements detailed in the Capabilities Development Document (CDD). Each industry team developed from the CDD a Specified Performance Document (SPD) that describes the required performance to meet the CDD requirements, then a build specification detailing how to build a ship to meet that performance. From these three documents, drawings and specifications detailing exactly what to construct were then developed. The contractual technical baseline is defined by the CDD, SPD and the build specifications, not the drawings. Configuration management is accomplished at the build specification level.

At present in the LCS acquisition, industry has developed drawing packages for LCS 1 and LCS 2. These include digital product models, extracted drawings and drawing liens, representing multiple changes accomplished to the drawings during production. Thus, while appropriate for use in construction by the existing industry teams, these packages were not envisioned to be used as the foundation documents for a build to print solicitation. It would not be prudent to pursue a build-to-print contract for the current design package until it fully reflects those changes.

The Navy's FY 2009 budget request did request funds to begin refinement of the Flight 0+ baseline design drawings and associated documentation into detailed production drawings and documents. These drawings will also incorporate production, assembly and fabrication lessons learned from the previous seaframes as well as operator feedback from the seaframe and mission package crews obtained during the testing and trials period. Additional time and resources will be necessary to complete a build-to-print package.

The build to print package requires the development of a neutral-format computer-aided design model (both 2-D and 3-D and STEP compliant) for the total ship, clearing all interferences for the model, and review and update of all additional required documentation to ensure that requirements are sufficiently detailed and "generic" to enable providers other than the incumbent to bid (e.g., the design can't reflect six-inch bent pipe if only the incumbent has facilities sufficient to accomplish this). The timing for completion of such a drawing package is dependent on completion of testing for the LCS lead ships. LCS 1 must complete Acceptance Trials 2 in Spring 2009 as well as seaframe developmental testing/operational testing or integration testing with mission packages. LCS 2 has not been delivered and must complete a similar test and trials period. The Navy is developing an estimate for LCS class design services needed to support this maturation.

Furthermore, to implement a full-and-open acquisition targeted at gaining increased access to additional shipyards, an approach must also be developed for the acquisition of the combat systems/networks/control systems/C4I equipment. To mitigate this risk for combat systems efforts under a build-to-print acquisition, the Navy would either need to direct the shipyards to contract with the current primes as subcontractors, or assume the role of providing the combat systems/networks/control systems/C4I equipment as GFE and develop the infrastructure necessary to serve as the integrator for the program.

LESSONS LEARNED

The Navy has incorporated many of the lessons learned from the initial LCS ships into overall acquisition policy and in specific shipbuilding programs.

On February 26, 2008, the Navy issued SECNAVNOTE 5000, which instituted an Acquisition Governance Improvement Six-Gate reporting, reviewing and oversight process that provides specific criteria for areas such as requirements, funding, and technical performance including a Probability of Program Success (PoPS) tool. This new process ensures that the various stakeholders from the resources, requirements and acquisition communities address and revisit at defined intervals, issues associated with technical maturity, affordability and program health.

Guidance emphasizing the use of independent engineering technical review boards and responsibility for Configuration Steering Boards to monitor requirements changes has been promulgated.

Initiatives to expand the size of the acquisition workforce and to evaluate the composition and experience of program offices are underway. Similar initiatives are underway in the technical and SUPSHIPS areas.

A rigorous production readiness review (PRR) prior to the start of fabrication is in place for shipbuilding programs. It was utilized for the start of fabrication for the DDG 1000, and will be used in the Joint High Speed Vessel (JHSV) program as well as the FY 2009 LCS ships.

A critical aspect of the PRR is design maturity. DDG 1000 requirements were that the design was at least 85% complete prior to start fabrication, including all units scheduled to start construction in the first six months. Similar criteria will govern the start of fabrication for JHSV and subsequent new ship designs.

SUMMARY

In summary, the Navy remains committed to the LCS program. LCS remains a critical warfighting requirement for our Navy to maintain dominance in the littorals and strategic choke points around the world.

The Navy continues to address the problems encountered in the early stages of the program and to implement improvements across the entire shipbuilding portfolio. We appreciate your strong support and the opportunity to testify before the Subcommittee. We will be pleased to answer any questions you may have.

Appendix E. Potential for Common Hulls

Some observers, including some Members of Congress, have expressed interest in the idea of using common hulls for Coast Guard cutters and smaller Navy combatants, so as to improve economies of scale in the construction of these ships and thereby reduce their procurement costs. In earlier years, this interest focused on using a common hull for the LCS and the Offshore Patrol Cutter (OPC), a cutter displacing roughly 3,000 tons that is to be procured under the Coast Guard's Deepwater acquisition program.[38] More recently, this interest has focused on using a common hull for the LCS and the National Security Cutter (NSC), a cutter displacing about 4,300 tons that is also being acquired under the Deepwater program. This appendix presents information regarding the idea of using common hulls for Coast Guard cutters and smaller Navy combatants.

July 2009 CBO Report

A July 2009 CBO report examines options for the Navy and Coast Guard to use common hulls for some of their ships. The report states that:

> some members of Congress and independent analysts have questioned whether the Navy and the Coast Guard need to purchase four different types of small combatants and whether—in spite of the services' well-documented reservations about using similar hull designs—the same type of hull could be employed for certain missions. To explore that possibility, the Congressional Budget Office (CBO) examined three alternatives to the Navy's and the Coast Guard's current plans for acquiring littoral combat ships and deepwater cutters.
>
> - Option 1 explores the feasibility of having the Coast Guard buy a variant of the Navy's LCS—specifically, the semiplaning monohull—to use as its offshore patrol cutter.
>
> - Option 2 examines the effects of reducing the number of LCSs the Navy would buy and substituting instead a naval version of the Coast Guard's national security cutter. (The rationale for this option is that, according to some analysts, the NSC's longer mission range and higher endurance might make it better suited than the LCS to act as a "patrol frigate," which would allow the Navy to carry out certain activities—maritime security, engagement, and humanitarian operations—outlined in the sea services' new maritime strategy.)
>
> - Option 3 examines the advantages and disadvantages of having the Coast Guard buy more national security cutters rather than incur the costs of designing and building a new ship to perform the missions of an offshore patrol cutter.
>
> According to CBO's estimates, all three alternatives and the services' plans would have similar costs, regardless of whether they are calculated in terms of acquisition costs or total life-cycle costs (see Table 1).6 CBO's analysis also indicates that the three alternative plans would not necessarily be more cost-effective or provide more capability than the services' existing plans. Specifically, even if the options addressed individual problems that the Navy and Coast Guard might confront with their small combatants, it would be at the cost of creating new challenges. For instance, Option 1—which calls for using the LCS monohull for the Coast Guard's OPC—would provide less capability for the Coast Guard from that

[38] For more on the Deepwater program, see CRS Report RL33753, *Coast Guard Deepwater Acquisition Programs: Background, Oversight Issues, and Options for Congress*, by Ronald O'Rourke.

service's perspective and at a potentially higher cost. Option 2 could provide the Navy with capability that, in some respects, would be superior for executing the peacetime elements of its maritime strategy; but that enhanced peacetime capability would sacrifice wartime capability and survivability. Option 3 would allow the Coast Guard to replace its aging cutters more quickly at a slightly higher cost but without the technical risk that is associated with designing and constructing a new class of ships, which the service's existing plan entails. It would, however, provide fewer mission days at sea and require the Coast Guard to find new home ports for its much larger force of national security cutters.[39]

Reported Proposal to Build Variant of NSC for Navy

In January 2008, it was reported that Northrop Grumman, the builder of the NSC, had submitted an unsolicited proposal to the Navy to build a version of the NSC for the Navy as a complement to, rather than a replacement for, the LCS.

January 14, 2008, Press Report

A press report dated January 14, 2008, stated:

> The U.S. Navy is stumbling to build the ship it wants—the Littoral Combat Ship (LCS)—so shipbuilder Northrop Grumman is urging the service to turn to a ship it can get sooner and cheaper: a patrol frigate version of the Coast Guard's National Security Cutter (NSC).
>
> "We have listened to what the Navy has said—to be more efficient, be innovative and produce affordable and capable ships," said Phil Teel, president of Northrop's Ship Systems sector. "The patrol frigate is a response to that, and to the Navy's new National Maritime Strategy."
>
> Northrop's analysts have studied remarks and themes oft repeated by senior Navy leaders and concluded a de facto requirement exists for a frigate-size ship capable of handling a range of low- and mid-intensity missions. Those missions, said Eric Womble, head of Ship Systems' Advanced Capabilities Group, are detailed in the Navy's new Maritime Strategy and include forward presence, deterrence, sea control, maritime security, humanitarian assistance and disaster response.
>
> "You don't want a high-end Aegis ship to handle those missions," Womble said, "you want something cheaper and smaller."
>
> The National Security Cutter (NSC) as configured for the Coast Guard could easily handle those roles, Womble said.
>
> The first NSC, the Bertholf, successfully carried out its initial trials in early December and will be commissioned this year by the Coast Guard. Womble said a Navy version would avoid the first-of-class issues that have plagued numerous Navy programs, including both designs being built for the LCS competition.
>
> Northrop in late December began briefing select Navy leaders on its unsolicited proposal. The company is taking pains to avoid presenting the ship as an LCS alternative, instead

[39] Congressional Budget Office, *Options for Combining the Navy's and the Coast Guard's Small Combatant Programs*, July 2009, p. 2.

calling it an LCS "complement," which is being built under a competition between Lockheed Martin and General Dynamics.

Key features of Northrop's concept are:

—The ship is based on a proven design already under construction.

—The NSC's weapons, sensors and systems already have a high degree of commonality with Navy systems, increasing affordability.

—While the NSC is 15 knots slower than the 45-knot LCS, the cutter can stay at sea up to two months, much longer than the LCS.

The report also stated:

Northrop is claiming it can deliver the first ship at the end of 2012 at an average cost of less than $400 million per ship, exclusive of government-furnished equipment, in fiscal 2007 dollars. That's close to the $403 million contract cost of the third NSC, which incorporates all current design upgrades.

A major element of Northrop's proposal, Womble said, is that the Navy should make no changes to the current Block 0 design. "That's the only way we can deliver the ship at this price."

The design, however, has plenty of room for upgrades, Womble claimed, and Northrop is proposing future upgrades be handled in groups, or blocks, of ships, rather than modifying individual ones. Those upgrades could include non-line-of-sight missiles, SeaRAM missile launchers and more capabilities to handle unmanned systems. The design even has room for an LCS-like reconfigurable mission area under the flight deck, he claimed.

Northrop admits the ships are deficient in one significant Navy requirement: full compatibility with the Naval Vessel Rules (NVR), essentially building codes developed by the Naval Sea Systems Command and the American Bureau of Shipping. The belated application of the NVR to both LCS designs was a major factor in the cost growth on those ships.

Most of the NSC design already is NVR-compatible, Womble said, but upgrading the entire design to NVR standards would involve a fundamental redesign and eliminate the proposal's cost and construction time attributes.

"We'd need a waiver [from the NVR rules] to make this proposal work," he said.

The report also stated:

Navy Response: 'No Requirement'

The official response from the Navy to Northrop's proposal so far is unenthusiastic.

"There is currently no requirement for such a combatant," said Lt. Clay Doss, a Navy spokesman at the Pentagon. The Navy's other surface ship programs, he said, "address specific requirements."

Doss did note that "the Navy and Coast Guard have considered a common platform for the LCS and the Coast Guard's National Security Cutter. However, due to the unique mission requirements of each service, a common hull is not a likely course of action."

Problems with the LCS have caused some observers to predict the program's demise, but the Navy "is completely committed to the LCS program," Doss said. "We need 55 Littoral Combat Ships sooner rather than later, and we need them now to fulfill critical, urgent war-fighting gaps."

Northrop however, is not alone in proposing the NSC as an LCS alternative. Coast Guard Capt. James Howe, writing in the current issue of the U.S. Naval Institute's Proceedings magazine, is urging Navy leaders to consider the NSC.

"I think the Navy should look at it," he said Jan. 10. "Northrop is building a naval combatant here. It has standard U.S. Navy weapon systems as part of its packages. Its communications are interoperable. It can handle underway replenishment. If there's a possibility it could be a cost saver or a good deal for the Navy, it needs to be explored."

Howe, who said he was unaware of Northrop's patrol frigate proposal, agreed the NSC is capable of further enhancements. "There's a lot of space on that ship," he said.

'Potential Game-changer'

Northrop likely is facing an uphill battle with its patrol frigate, as the Navy culturally prefers to dictate requirements based on its own analysis.

But the Navy is having trouble defending the affordability of its shipbuilding plan to Congress and bringing programs in on budget. One congressional source noted the service "can't admit their plan won't work." An unsolicited proposal, the source said, "opens the way for someone else to come up with a potential game-changer."

Northrop's plan, the source said, may be an unexpected opportunity.

"Northrop is listening to the people who have been criticizing the Navy's shipbuilding plan," the source said. "They've gotten a sense that maybe the Navy is looking for a solution, and the Navy can't produce a solution because it might be too embarrassing."

One more aspect that could be at work in the Northrop proposal: "I think there's something coy going on here," the source said. "They may be promoting this as an LCS complement, but their idea might be part of a strategic plan to replace the LCS."[40]

January 17, 2008, Press Report

A press report dated January 17, 2008, stated:

> Northrop Grumman Corp said on Wednesday [January 16, 2008, that] a proposal to turn its 418-foot Coast Guard cutter into a new class of Navy frigates is sparking some interest among U.S. Navy officials and lawmakers.

[40] Christopher P. Cavas, "Northrop Offers NSC-Based Vessel To Fill LCS Delays," *Defense News*, January 14, 2008.

> Northrop is offering the Navy a fixed price for the new ship of under $400 million and could deliver the first one as early as 2012 to help out with maritime security, humanitarian aid and disaster response, among other things, said Eric Womble, vice president of Northrop Grumman Ship Systems.
>
> So far, the officials briefed have found Northrop's offer "intriguing," Womble told Reuters in an interview. "They like the fact that we're putting an option on the table. No one has told us, 'Go away, don't come back, we don't want to hear this'," Womble said.
>
> At the same time, the Navy says it remains committed to another class of smaller, more agile ships—the Littoral Combat Ships (LCS) being built by Lockheed Martin Corp (LMT.N: Quote, Profile, Research) and General Dynamics Corp (GD.N: Quote, Profile, Research)—amid huge cost overruns.
>
> "There currently is no requirement for a frigate," Navy spokesman Lt. Clay Doss said. He said the Navy and Coast Guard had discussed a common hull during the initial stage of the LCS competition, but agreed that was "not a likely course of action due to the unique mission capabilities."
>
> For now, he said the Navy was proceeding as quickly as it could with the 55-ship LCS program as well as design work on a new DDG-1000 destroyer, and a planned cruiser, CG-X....

The report also stated:

> Virginia-based defense consultant Jim McAleese said the fixed-price offer could be good news for the Navy, which has typically borne the risk of cost-based shipbuilding contracts.
>
> "That is a potential catalyst that could have a huge impact on the way the Navy buys small- and mid-sized surface combatants," McAleese said.
>
> Northrop says its new Coast Guard cutter also experienced some cost growth, but says that was mainly due to requirements added after the Sept. 11, 2001, hijacking attacks. The first of the new ships is due to be delivered to the Coast Guard in March, followed by one ship annually over the next few years.
>
> Northrop said it could offer the Navy a fixed price on the frigate because design work on the ships is already largely completed. Its price excludes government-furnished equipment that would still have to be put on board.
>
> "We're not advocating an LCS replacement," said spokesman Randy Belote. "But after listening to the Navy leadership and studying the new maritime strategy, we think we can get hulls and capabilities into the water at a much faster pace."
>
> Womble said Northrop analysts and an outside consultant studied the Navy's needs and concluded the Navy could use another ship that can operate in shallow water, be forward deployed, has the range and endurance to operate independently, and can work with U.S. allies, if needed.

The press report also stated:

> The proposed ship can be deployed for 60 days without new supplies, has a range of 12,000 nautical miles, and can travel at 29 knots, fast enough to keep up with other warships. That compares to 20 days and a range of 3,500 miles for LCS.

Northrop began sharing a PowerPoint presentation about the proposal with Navy officials and lawmakers at the end of December, and has already met with several senior officials, including Chief of Naval Operations Adm. Gary Roughead.

It could deliver the first frigate by 2012, if the Navy was able to add $75 million for long lead procurement items into the fiscal 2009 budget proposal to be sent to Congress next month, Northrop said.

The frigate is about 75 percent compliant with special requirements that apply only to U.S. Navy ships. Northrop said it believed it could qualify for waivers on the remaining 25 percent because similar waivers were granted in the past.[41]

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[41] Andrea Shalal-Esa, "Northrop Offers US Navy New Ship For Fixed Price," *Reuters*, January 17, 2008.