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NAVY DESTROYER ACQUISITION PROGRAMS

HEARING

BEFORE THE

SEAPOWER AND EXPEDITIONARY FORCES SUBCOMMITTEE

OF THE

COMMITTEE ON ARMED SERVICES
HOUSE OF REPRESENTATIVES

ONE HUNDRED TENTH CONGRESS

SECOND SESSION

HEARING HELD
JULY 31, 2008

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NAVY DESTROYER ACQUISITION PROGRAMS

HOUSE OF REPRESENTATIVES,
COMMITTEE ON ARMED SERVICES,
SEAPOWER AND EXPEDITIONARY FORCES SUBCOMMITTEE,
Washington, DC, Thursday, July 31, 2008.

The subcommittee met, pursuant to call, at 10:00 a.m., in room 2212, Rayburn House Office Building, Hon. Gene Taylor (chairman of the subcommittee) presiding.

OPENING STATEMENT OF HON. GENE TAYLOR, A REPRESENTATIVE FROM MISSISSIPPI, CHAIRMAN, SEAPOWER AND EXPEDITIONARY FORCES SUBCOMMITTEE

Mr. TAYLOR. The hearing will come to order.

I want to welcome everyone and say this may be the most important hearing this subcommittee has held since a year ago January when we had the hearing on the procurement of mine-resistant ambush protected vehicles.

I want to thank all of you for being here.

And because of the importance of this topic, the ranking member and I have extended an invitation not only to our fellow colleagues on the full committee and in the full House, but also any Members of the Senate who wish to participate.

So, in accordance with the Rules of the House, I ask unanimous consent for our colleagues to be able to participate today.

Hearing no objection, our colleagues will participate in regular order after all members of the subcommittee have had an opportunity to ask questions. Because of time constraints and the number of Members who wish to ask questions, the clerk will maintain the five-minute clock during the question-and-answer period for the members. We have been very fortunate, and I am told we are not expecting any votes on the House floor for about two hours, and so that works in our favor.

When Mr. Bartlett and I first called this hearing, the purpose was to ensure that all the facts associated with the capabilities and the procurement costs of the DDG 1000 and the capabilities and the procurement costs of the DDG 51 were discussed in an open session by a variety of expert witnesses. We envisioned a hearing that would clear the air of rumor and lay out all of the facts without championing any side of the debate.

Much has changed since that time. Last week, the Secretary of the Navy and the Chief of Naval Operations (CNO) announced that they would stop the DDG 1000 destroyer class at two ships, and restart the procurement of the DDG 51 class of destroyers. They propose an additional eight ships in the five-year plan beginning next year.

Predictably, this announcement from the Navy has generated a fire storm. There are Members who are opposed to the decision, and Members who support the decision. There also appears to be significant efforts by some defense contractors to shore up support for the DDG 1000 and Congress to overturn the Navy's decision.

We still need to have this hearing to clear the air on mission capabilities and cost for the two destroyer programs.

By now, I presume our Navy witness, particularly Vice Admiral McCullough, who is a senior officer in the Navy charged with developing future platforms and technologies, will attempt to educate the committee on the reasons the Chief of Naval Operations has decided that he can best support the interests of national security with continuing the line of DDG 51 class ships than he can with the small class of highly capable but expensive DDG 1000s.

The committee was and remains concerned concerning the cost estimates for the DDG 1000. But let us be perfectly clear, this subcommittee did not recommend canceling the DDG 1000 program as some in the press have said. This subcommittee did recommend and the full House did adopt in May a pause for the third DDG 1000 while the development of technologies and the true cost of construction became known. This subcommittee also recommended allowing the option of returning to the DDG 51 class if the Navy could prove it was in the best interest of our Nation. The report accompanying our bill clearly states that the funding provided in the Fiscal Year 2009 National Defense Authorization Act could be used for either DDG 1000 advance procurement or DDG 51 advance procurement.

I would like to make my position perfectly clear: I want the Navy to have the finest, most capable fleet in the world. I want the Navy to have a sufficient number of ships with the capabilities needed to counter the next generation of threats.

I don't think we have enough submarines, and this subcommittee has worked in a bipartisan manner to allow the Navy to increase the production of submarines. My friends, Joe Courtney of Connecticut and Rob Wittman of Virginia, were instrumental in this effort.

I don't think we have enough amphibious assault ships for our expeditionary forces, and with the support of Mr. Bartlett, we have authorized an additional Amphibious Transport Dock Ship (LPD) for the Navy's fleet.

And I don't think we have the correct balance in our surface combatant force.

I understand the history of the DDG 1000. It grew out of the DD 41 program and became the poster child for revolutionary change of ship capabilities during the Rumsfeld era. The question before this Congress is simple: Does this ship have the correct capabilities that our Navy needs in the future? Does our Navy ever envision shore-bombardment again? If not, why design a ship which is sized for a gun that won't be used? In this day of precision-guided munitions and air dominance, the idea of a World War II style Naval bombardment needs to be debated.

This leads us to DDG 51, without question, the finest destroyer in the world today. A ship that is capable of multiple missions, from anti-submarine warfare (ASW) to cruise missile strike warfare

to area air defense with its Aegis weapon system, it is the premier workhorse of our fleet. And perhaps most important, the ship is capable of serving in a ballistic missile defense (BMD) role, which the DDG 1000 cannot do. Again, I think this bears repeating: The DDG 51 is capable of serving in a ballistic missile defense role; the DDG 1000 is not.

Fifty-three of the DDG 51s are currently in the fleet. Nine more are in various stages of construction. If the Navy wants to build more of them, we need more information; information not just about cost targets for new ships, but information on the total concept of support for the entire fleet of destroyers. The modernization program for destroyers is just as important as the construction program. We can never allow the decommissioning of ships, like we did with the first five Aegis cruisers, because they could not be modernized to meet the new threat. When a ship is retired at less than 30 years of age, the Navy has failed and this Congress has failed in our oversight. We can only get to a 300-ship Navy if we are building at least 10 ships a year and we keep them in the fleet for at least 30 years.

So this committee is interested in the DDG 51 modernization program. We will also question why the Navy is not modernizing these destroyers at a faster rate and doing the modernization in construction shipyards which have the expertise and experience to do major modifications.

We would like to know how we can use these technologies developed in the DDG 1000 weapon system and propulsion, and back fit them into the DDG 51s during modernization.

So we have a lot to discuss. Our Navy has a tough road ahead. There are still some pretty large hurdles in Congress that we will need to jump, and hopefully this hearing will allow the Navy to explain their side of the issue.

We have two panels of experts today to walk us through all of these issues. We are very fortunate to have Vice Admiral McCullough give the subcommittee a brief tutorial of both vessels at the beginning of his testimony. Members will also find a side-by-side description of the ships in a memorandum prepared by staff.

Our Nation needs to get this right. Our Nation needs to put our Navy on a stable path of building ships and building them at a time and cost as projected. Our shipyards and the contractors who support them deserve to know what we expect them to do and when we expect them to do it. But more important, we need to give our Naval commanders the capability they need to defeat all current and potential threats.

So I believe the debate needs to focus on the capabilities of these ships, and I remind my colleagues and the public that the numbers of ships itself is a significant capability. The full Congress must weigh the capabilities of these ships, the costs associated with these ships and the effects on the Nation's national security industrial base when making the final decisions whether to proceed or not to proceed in the destroyer program.

I am very happy to acknowledge our first witnesses today. The Secretary has truly sent his "A" team: Ms. Allison Stiller, Deputy Assistant Secretary for Ship Programs in the Office of the Assist-

ant Secretary of the Navy for Research, Development and Acquisition; and Vice Admiral Barry McCullough, who is the Deputy Chief of Naval Operations for Integration of Resources and Capabilities.

Our second panel also consists of witnesses well known to this committee: Mr. Ron O'Rourke, who is the senior analyst in Naval affairs with the Congressional Research Service; Dr. Eric Labs, who conducts independent ship cost analyst with the Congressional Budget Office; and Mr. Paul Francis, who heads the Maritime Analysis Branch at the Government Accountability Office.

I want to thank all of the witnesses for being with us today, and I want thank the phenomenal staff that this subcommittee has for helping get everybody here today and for their work in preparing for this hearing.

I now want to recognize our very, very capable ranking member, Mr. Bartlett.

[The prepared statement of Mr. Taylor can be found in the Appendix on page 61.]

STATEMENT OF HON. ROSCOE G. BARTLETT, A REPRESENTATIVE FROM MARYLAND, RANKING MEMBER, SEAPOWER AND EXPEDITIONARY FORCES SUBCOMMITTEE

Mr. BARTLETT. Thank you very much.

Good morning and welcome to both panels, Admiral McCullough, Ms. Stiller; and on the second panel, Mr. O'Rourke, Mr. Francis and Dr. Labs.

It is a pleasure to have you here with us today, and I am sympathetic to the challenges you face.

For years now, in fact even up to a few months ago, the Secretary and the CNO have sent you to testify before this subcommittee to explain, and at times, to defend the Navy's shipbuilding plan. In particular, we have long debated the wisdom of developing the DDG 1000. But I understand, after speaking to the CNO last week, that the Navy has finally come to the conclusion that the Nation would be better served by extending the DDG 51 production line and truncating the DDG 1000 line at two ships.

Now you have joined us with the daunting task of explaining this about-face and the consequences of such a decision. It is appropriate for Congress to question this decision and to assume the role of devil's advocate to ensure that we do not haphazardly embark on another deviation to the shipbuilding plan. But I will tell you up front what I told the CNO, I for one applaud this move.

The chairman and I have both said over and over that the Navy will never achieve a 313-ship Navy without either top-line relief or a significant change in the mix of platforms.

The Navy shipbuilding plan was based on several assumptions, none of which were realistic. The Navy postulated that, first, personnel costs would not increase because the Navy's active end strength could be reduced. I will note this has not proved true for any of the Navy's sister services.

Second, there would be no increase in operations and maintenance accounts, but the price of fuel alone has invalidated this assumption. Overall, DOD fuel expenditures grew by 380 percent from 1997 to 2007, even though fuel purchases only increased by 26 percent during this time frame.

Third, funding for research and development would be reduced and stay low, in effect trading for today's capabilities on the backs of tomorrow's sailors. But given the challenges we have seen in developing technologies for many of our current platforms, this, too, does not hold true.

And, fourthly, that shipbuilding funds would be protected among the procurement accounts. One can argue that the Navy has done this to a certain extent, but we have real shortages in other areas, such as Naval aviation. Moreover, cost increases within the shipbuilding accounts come at the expense of other shipbuilding programs, as we have seen with the T–AKE (Dry Cargo/Ammunition Ship), the Littoral Combat Ship (LCS) and LPD 17.

And fifthly, requirements in cost growth could be prevented on future ships. Again, LCS has been a prime example of the fallacy of this assumption.

Therefore, given that none of these assumptions have been shown to be plausible, then the only other alternative is to look at the mix of platforms. The DDG 1000 program is the obvious first choice for reevaluation because it is the largest and most expensive combatant we are building, and surface combatants are the backbone of our battle force, and it is undeniable that the costs for this program have grown. The original Navy estimate for the fifth DDG(X) was between $1.06 billion and $1.23 billion. Now the Navy estimates it would cost double that, approximately $2.3 billion.

Many independent analysts have cautioned about the potential impacts to the Navy should the cost of the DDG 1000 continue to grow.

Some of our witnesses today are among that number, and I will quote Bob Work from the Center for Strategic and Budgetary Assessment who has stated, "Indeed, even if the Navy's optimistic ship cost estimates prove to be true, it seems certain that the seven DDG 1000s and 19 CG(X)s will continue to have inevitable disproportionate impacts on plans for the future surface battle line and the larger 313-ship battle fleet."

Moreover, I repeatedly stated that a class of seven ships is no class at all, but rather a technology demonstration program on a massive scale. When I learned it was unlikely that the DDG 1000 hull could be used in the CG(X) program, the begrudging support I had for this program began to fade.

However, I will issue one note of caution. As we reevaluate our platform mix, we must ensure that we choose platforms that will optimize the capabilities of our fleet for the future threat, not to fight yesterday's or today's wars.

We also do not want to artificially adjust the mix of hot and multi-mission combatants and focus low-end mission ships exclusively based on costs. In many respects, this is the history of the convoluted DDG 21, DD(X), DDG 1000 program. Consideration must be given to both the future operating environment and to economics.

To that end, I want to hear more about the analysis the Navy has done regarding future mission sets. If we do not build five more DDG 1000s, what risk are we assuming? What will our Navy not be able to do?

In the past, we have been told that the DDG 1000 will be significantly more stealthy, which will be necessary for ship self-defense and to improve the ship's land-attack mission. We were also told that the Navy needed to reduce ship's manning. DDG 1000 has an estimated crew size of less than half that of the DDG 51. We were told that the introduction of an integrated power system would improve ship survivability, reduce fuel consumption, and open the door for a new directed energy weapons systems.

What is to be the fate of these technologies and the investments we have made? Are these factors no longer as important as others?

There are many other issues than these to consider, but I am eager to learn from our witnesses and give Members an opportunity to ask questions.

I remind witnesses that we value and respect your opinions. All we ask is you lay out the true warfighting requirements and be clear about what risk we must accept with the funding choices we will have to make.

Thank you, Mr. Chairman.

Mr. TAYLOR. Thank you, Mr. Bartlett.

Given the nature of today's hearing, that this is as much a hearing as a tutorial from the Navy to this subcommittee, I am going to recommend to the subcommittee that we waive the 5-minute rule for our first two witnesses and allow them to speak for 10 minutes and that for the additional speakers on the second panel, that we give them 7 minutes.

So without objection, so ordered.

It is my understanding, Admiral, that you wish to speak for both you and Ms. Stiller.

The Chair recognizes Admiral Barry McCullough for 10 minutes.

STATEMENT OF VICE ADM. BARRY MCCULLOUGH, USN, DEPUTY CHIEF OF NAVAL OPERATIONS FOR INTEGRATION OF CAPABILITIES AND RESOURCES; ACCOMPANIED BY ALLISON STILLER, DEPUTY ASSISTANT SECRETARY OF THE NAVY, SHIP PROGRAMS

Admiral MCCULLOUGH. Chairman Taylor, Ranking Member Bartlett, and distinguished Members of Congress, I am honored to appear before you with Ms. Stiller to discuss the Navy's surface combatant plan.

I request our written testimony be entered into the record.

The Navy's plan to truncate the DDG 1000 program at two ships and reopen the DDG 51 line best aligns our surface combatant investment strategy to meet Navy and combatant commander warfighting needs.

The reason for the change to the Navy's DDG plan is to prioritize relevant combat capability. In this plan, the Navy addresses the changing security environment, the dynamic capability of the fleet, and provides for maximum stability for the industrial base.

Modernizing the fleet's cruisers and destroyers and executing an affordable shipbuilding plan are crucial to constructing and maintaining a 313-ship Navy with the capability and capacity to meet our country's global maritime needs.

The new Navy plan is based on requirements and needed warfighting capability and capacity. The first two DDG 1000s will

be completed as planned and additional DDG 51s included in the Navy's shipbuilding program. This proposed decision has acquisition and industrial base implications.

We face a growing proliferation of ballistic missiles and anti-ship cruise missiles that demand greater integrated air and missile defense capability. Anti-submarine warfare, anti-ship cruise missiles, and theater ballistic missile gaps pose increased risk to our forces. Non-state actors who in the past have posed low-tech threats are expanding their reach with improved high-end capabilities and advanced anti-ship cruise missiles.

The revised DDG plan enhances ballistic missile defense, integrated air and missile defense, and anti-submarine warfare to crown our growing anti-access strategies. The demand from combatant commanders is for ballistic missile defense, integrated air and missile defense and anti-submarine warfare best provided by DDG 51s and not the surface fire support optimized in DDG 1000.

The Marine Corps supports the Navy's position on DDG 1000, just as the Navy remains firmly committed to Marine Corps and joint and combined force clearly stated surface-fires requirements. These Naval surface fire requirements can be met with existing precision strike capability from tactical Tomahawk, improved aircraft delivered precision munitions, and current surface combatants.

Additionally, the Navy is researching capability to extend the range of current surface guns to meet ship-to-objective maneuver required ranges. The Navy-Marine Corps team has initiated an in-depth review to look at how surface-caught fire capability fits into the Littoral Combat Ship. DDG 1000 does not provide area air defense or ballistic missile defense.

Beyond addressing the capability requirements, the Navy needs to have the right capacity to meet combatant commander warfighting requirements and remain a global deterrent. Combatant commanders continue to request more surface ships and increased Naval presence to expand cooperation with new partners in Africa, the Black Sea, the Baltic region and the Indian Ocean. This is in addition to the presence required to man our relationships with current allies and partners. Therefore, the Navy must increase surface combatant capacity to meet combatant commander demands today for ballistic missile defense, theater security cooperation, and steady-state security posture, simultaneously developing our fleet to meet future demands. Africa Command capacity demands will not mitigate growing European Command requirements and Southern Command has consistently required surface combating presence that in the majority goes unfilled. The Navy remains committed to our ballistic missile defense partners around the globe, including Japan, Korea, the Netherlands and Spain.

The 30-year shipbuilding plan was designed to field a force structure based on the fiscal year 2020 requirements of the National Security Strategy and the Quadrennial Defense Review. The 313-ship force floor represents the maximum acceptable risk in meeting the security demands of the 21st century.

In the balance of capability and capacity, the Navy has found there are increased capability gaps, particularly in integrated air and missile defense and ballistic missile defense, as we continue to

review our Force Structure Plan in support of the developing fiscal year 2010 program objective memorandum.

The DDG 1000 is a capable ship which meets the requirements for which it was designed. There are 10 promising major technologies in the DDG 1000 program that have potential utility but have yet to be assessed in operational environments. Completing the two ships under contract will allow that assessment, most importantly, that of the new hull form, low radar cross-section, dual-band radar, and minimal manning initiatives. There will be an impact to DDG 1000 prime contractors and secondary and tertiary suppliers. Developmental costs, which make up a significant investment in DDG 1000, specifically the total ship computing environment and dual-band radar, will still be incurred to ensure we acquire usable products from the DDG 1000 effort that we are incorporating in the CVN–78 class and can leverage in future shipbuilding programs.

The next generation cruiser, referred to as CG(X), will be an air and missile defense battle space dominant ship and is being developed to counter the increasingly difficult missile threats we face and project. The technologies resident in the DDG 51 provide extended range air defense now and, when coupled with open architecture initiatives, will best bridge the transition to the enhanced ballistic missile defense and integrated air and missile defense capability envisioned in the CG(X).

We believe this evolutionary path is correct and addresses the capability gaps more quickly than maintaining the DDG 1000 program beyond the first two ships. Additionally, production costs for DDG 51 are quantifiable.

Your Navy remains committed to building the fleet of the future and modernizing our current fleet to meet increasingly complex threats. Continuing to build DDG 51s enables us to expand warfighting capability, reach the required 313-ship force structure sooner and, with the technology demonstrated in DDG 1000 and DDG 1001, best bridge to CG(X).

Within the constrained shipbuilding resources available to the Navy, evolutionary improvement of existing proven capabilities must take priority to restrain the decline in size and relevant combat capability of the fleet.

If you will now refer to the two ship charts you have been provided, I will compare the warfighting capability provided by DDG 51 and DDG 1000.

[The charts referred to were not available at the time of printing.]

Admiral MCCULLOUGH. DDG 1000 is an approximately 15,000-ton guided missile destroyer with a maximum speed of approximately 30 knots and a cruising endurance of approximately 4,500 nautical miles at 20 knots. It has the dual-band radar, consisting of the S-band volume search radar and the X-band multi-function radar. It has a vertical launch system capacity of 80 cells and is capable of self-defense, anti-air warfare capability with the enhanced Sea Sparrow missile. The vertical launch system (VLS) also provides long-range land-attack capability with tactical Tomahawk.

DDG 1000 has 2 advanced gun systems, 6-inch caliber with a magazine capacity of 600 rounds and a firing range of approximately 63 nautical miles with a long-range land-attack projectile.

DDG 1000 anti-submarine capability consists of a dual-frequency, bow-mounted active sonar, a multi-function towed array passive sonar, a torpedo countermeasure system, and a vertical launch anti-submarine rocket. It has a helicopter hangar and is capable of operating two H–60 helicopters or one H–60 aircraft with three vertical take-off unmanned aerial vehicles.

By comparison, the DDG 51 is a 9,600-ton guided missile destroyer with a similar maximum speed of approximately 30 knots and an endurance range of 4,500 miles at 20 knots. It has the SPY–1D(V) radar and a vertical launch system capacity of 96 cells and is capable of a sea-based defense area anti-air-warfare capability with SM–2 standard missiles.

Additionally, it can provide ballistic missile defense capability with the SM–3 interceptor. The VLS also provides long-range land-attack capability with tactical Tomahawk.

The DDG 51 has one Mark 45 gun, 5-inch caliber with a magazine capacity of 550 rounds and a firing range of approximately 13 nautical miles. DDG 51 anti-submarine warfare capability consists of the SQQ–89 combat system with a triple frequency bow-mounted active sonar, multi-function towed array passive sonar, a torpedo countermeasure system, 6 torpedo tubes, and a vertical launch anti-submarine rocket.

It has a helicopter hangar and is capable of operating two H–60 aircraft.

The fuel usage for DDG 51 is approximately 30 percent less than that projected of the DDG 1000 under the same operating conditions.

In summary, specific capability differences include: DDG 1000 was designed to be optimized in a littoral environment and is expected to meet the challenges it would face in that environment in most cases more effectively than would the DDG 51. The dual-band radar has better capability in a high-clutter environment and the low-power, high-frequency sonar is more effective in shallow water reverberation-limited environments. However, as currently configured, the DDG 1000 cannot perform area-air defense and is incapable of conduction ballistic missile defense. In addition, though significantly quieter and superior in littoral anti-submarine warfare, DDG 1000's lower power sonar is less effective in active blue-water anti-submarine warfare prosecutions than is the case for the DDG 51.

The future threat, particularly from proliferated ballistic missiles and advanced anti-ship cruise missiles, can be better addressed by the DDG 51. Modifying the DDG 1000s to support these missions is unaffordable from the Navy's standpoint. Given the range of missions assigned to the Navy in the future, the technical complexity of the threats we are to face, and the relevant likelihood we will be called upon to execute these missions, the greatest single threat is the proliferation of advanced ballistic missiles followed by a burgeoning deep water quiet diesel submarine capability by potential adversaries.

The future Navy will have to address these threats first, and today, the DDG 51 presents more capability in these areas than does the DDG 1000. It is particularly critical that the Navy receive authorization of full funding for restart of DDG 51 in fiscal year 2009 to support our proposed fiscal year 2010 program objective memorandum and for the continuation of DDG 1000 essential efforts.

In the interest of time, I was unable in this opening statement to answer specifically all of the questions posed in your letter dated 25 July to Secretary Winter.

Ms. Stiller and I look forward to addressing your concerns regarding mission capability, cost analysis, industrial base and DDG 51 modernization. Thank you to each one of you and to the Congress for supporting the United States Navy.

[The joint prepared statement of Admiral McCullough and Ms. Stiller can be found in the Appendix on page 64.]

Mr. TAYLOR. Thank you very much, Admiral.

And thank you, Ms. Stiller, for being here.

I would like to remind all interested parties that the purpose of this hearing was to clear the air between the DDG 1000 and DDG 51, and that each of the contractors involved was given the opportunity to participate in the hearing as far as being witnesses.

Again, I want to remind people that we invited any Senator who wished to participate. And so the people who are on the witness stand are those who chose to participate today. But we want to make it perfectly clear that we have given everyone on each side of this debate ample opportunity to say their piece.

The Chair now recognizes the gentleman from Maryland, our ranking member, Mr. Bartlett.

Mr. BARTLETT. Admiral, you kept referencing the anti-submarine warfare capabilities of the DDG 1000 and its capability in the littorals. How far along was the design of the DDG 1000 before LCS came on the scene?

Ms. STILLER. From a budgetary perspective, we have had R&D for DDG 1000—it was not DDG 1000 at the time; it was DDG(X)—since fiscal year 1995. LCS is about 2002 time frame. I think I have that right.

Mr. BARTLETT. You kept emphasizing that if we truncate the DDG 1000 line and go to the DDG 51, that we will have less capability in anti-submarine warfare and in the littorals. But wouldn't the number of LCSs that we are planning more than compensate for that?

Admiral MCCULLOUGH. The LCS has an anti-submarine package, Congressman, and it utilizes remotely piloted vehicles, active and passive towed arrays and helicopter support.

We have also worked for a distributed system development that I would have to take into a closed hearing.

But the LCS ASW mission module provides very, very good anti-submarine capability in the littoral. What I was trying to compare here was the capability resident in the DDG 1000 as compared to the DDG 51.

Mr. BARTLETT. I understand, in 1995, when we started the conceptual design of the DDG 1000, had we known that the LCS was

coming along, the 1000 might have been a very different ship, might it not?

Admiral MCCULLOUGH. I would be speculating if I answered that question, Congressman. I wasn't in the Pentagon when those decisions were made.

I will tell you, we developed a littoral combat ship for operations in the littoral, and as we have looked at the evolution of the threat over the past several years, it is more in the blue-water region for anti-submarine warfare, as recently demonstrated in the Western Pacific.

Mr. BARTLETT. From 1995 on, operation in the littorals became more and more a priority, and it resulted, of course, in the design of a whole new class of ships, the LCS. I think that is an important element in the Navy's decision to truncate the 1000 line and to build more 51s because a major focus of the 1000, the littorals and anti-submarine warfare, is now I think more than adequately done by the LCS in its missions there. This is just one of the several considerations that the Navy used in a decision to truncate the 1000 line and to move to the 51. Also, and we do not know the final cost on either of these, but the 51 is certainly going to cost less in most people's projections than the 1000, and so will this move us more quickly to a 313-ship Navy?

Admiral MCCULLOUGH. Yes, sir, it will.

Mr. BARTLETT. Thank you very much, Mr. Chairman.

Mr. TAYLOR. The Chair now recognizes the gentleman from Connecticut, Mr. Courtney.

Mr. COURTNEY. Thank you, Mr. Chairman.

First of all, I just wanted to say that I think the record should reflect that this hearing was actually scheduled before the Navy's announcement on July 24.

And I think Mr. Taylor and Mr. Bartlett deserve a lot of credit for the fact that they have really been on top of this issue, and this committee has been doing a very credible job of oversight on this program, and I think that should be noted.

I want to follow-up on Mr. Bartlett's last question. When the Navy issued its statement on the 24th, it actually said that the 313-ship level would be reached sooner, and you just testified that it would. My recollection is when Admiral Roughead appeared before the committee earlier this year, he had pushed back the projection for a 313-ship Navy to I think 2019 was my recollection.

Admiral MCCULLOUGH. Yes, sir, I believe that is correct. In accordance with the shipbuilding plan, it was presented to Congress with the President's Budget Request for fiscal year 2009 (PB09) submittal.

Mr. COURTNEY. So can you say with any more specificity about whether this decision will change that date?

Admiral MCCULLOUGH. Yes, sir, we believe it will. The plan that we played out is a proposal in our POM submittal to the Office of the Secretary of Defense (OSD), so this is still being worked within the Defense Department.

My initial estimates—and I have my people working the shipbuilding plan; it will be submitted to Congress—is that we will be able to achieve the 313 plan approximately 2 years earlier.

Mr. COURTNEY. In your opening statement, you said that one of the goals of this change is to, I wrote it down real fast here, is to maximize industrial base stability, was part of the decision. This is not one of my yard's vessels, but my understanding is that the 1000 requires more shipyard workers than the 51. How do you envision maintaining that stability?

Ms. STILLER. We are still in the process of defining an acquisition strategy going forward, and we will be working with the Secretary of Defense's Office on that. Certainly, industrial-based considerations must be weighed in that acquisition planning, and we will do that.

Mr. COURTNEY. I am sure there may be some follow-up questions to that point later.

I guess my last question is that, Admiral, you testified that you are hoping that the Congress is going to act in the 2009 budget to sort of begin implementing this change. I think that is how you finished your testimony; is that right?

Admiral MCCULLOUGH. Sir, what I would say is, this is a Program Objective Memorandum (POM) plan. And as one of the gentlemen referenced, our proposal is for eight DDG 51s in the fiscal year 2010 program, from fiscal year 2010 through fiscal year 2015. We believe to enable that program a President's Budget Request for 2009 (PBO9) adjustment to make it DDG 51 in fiscal year 2009 supports our POM–10 submittal. And that is what we would like to see happen, yes, sir. But that is in support of our POM–10 submittal, sir.

Mr. COURTNEY. So what happens if we don't do that? I guess I am trying to sort of play this out a little bit, because it is kind of late in the process.

Admiral MCCULLOUGH. Yes, sir, we understand that.

What I would say is—Allison, when was the last year we started building the DDG 51s?

Ms. STILLER. The last DDG 51 was appropriated in fiscal year 2005, and so the point Admiral McCullough I think is trying to make here is, you would have a significant production break if you wait until fiscal year 2010. So the desire is to consider in 2009 as well. So that is part of the discussion we are having.

If your question is if another DDG 1000 was authorized and appropriated, from an acquisition perspective, I have an approved acquisition strategy for the 1000 program as well. Surface combatant in fiscal year 2009 is critical, we believe, to the industrial base.

Mr. COURTNEY. Thank you.

I have no further questions, Mr. Chairman.

Mr. TAYLOR. The Chair recognizes, again, given the unanimous consent request, the Chair now recognizes Mr. Saxton.

Mr. SAXTON. Thank you, Mr. Chairman.

Admiral, during your testimony, you, I believe, said that the DDG 1000 had some advantages as compared to the DDG 51 and that the DDG 51 had some advantages as compared to the DDG 1000. I think you indicated that the DDG 1000 had some advantages in the littoral environment, and that it had an advantage with the dual-band radar, and it had an advantage in shallow water, sonar in shallow water.

At the same time, you indicated that DDG 51 had some advantages in air-to-air defense, in ballistic missile defense, in anti-ship missile defense, in anti-submarine defense in deep water. Did I get that all? Is that a synopsis of what you said?

Admiral MCCULLOUGH. Yes, sir, that is a fair assessment. The dual-band radar has both and S- and an X-band radar capability. And that works very well in the cluttered environment of the sea/shore interface.

Mr. SAXTON. Here is the question that I wanted to ask. Members of this subcommittee and members of the full committee have followed very closely the evolution of DDG 51. I did myself, and I saw it as a new system in the 1980's with capabilities that were different, much less capable than the Aegis system today. And I followed that evolutionary path until very recently DDG 51 with the missile technology. The anti-missile technology that it has was able to take a satellite out of the atmosphere.

Admiral MCCULLOUGH. Yes, sir.

Mr. SAXTON. And that was quite a learning curve over a long period of time and evolutionary developments that took place that gave us capabilities today that nobody else presumably in the world has, a package of capabilities.

So I guess this is my question: If DDG is not as good as 1000 in the littoral environment and if it is not as good in the dual-band radar component, which I don't fully understand, I must admit, and if it is not as good in the sonar department in shallow water, how will we meet these three—how will DDG and other Naval assets be able to meet these requirements?

Admiral MCCULLOUGH. I will address the ASW first, sir. As was suggested, the LCS has quite good capability in the littoral environment from an anti-submarine warfare perspective, both from an active and passive and a combination of the two use of sonars and distributed systems. So we think we have that challenge met with the ASW portion of the LCS.

The dual-band radar was specifically designed to function at the sea-land interface in a clutter environment. What I would tell you is it does very well there. It does exactly what we designed it to do, and that is because of the combination of the X-band and the S-band.

As initially configured, and as you suggest, the SPY–1A in the early 1980's did not do well in the sea-land interface. And we have evolved that radar from a SPY–1A to a SPY–1B to a SPY–1D(V). And the SPY–1D(V) is capable and can meet the threats in the littoral environment.

And as you also suggest, we have evolved that radar to where it can shoot down satellites in outer space if that is what we so desire. It wasn't designed for that. It wasn't designed for ballistic missile defense, but we have evolved that system to meet that capability set.

Now, granted, the system, the SPY system, the Aegis system is not designed to shoot down satellites, and that was a one-time event, but it is configured to track and engage ballistic missiles.

People ask me what the accuracy of the thing is, and I will tell you, we can pick where on the short- and medium-range ballistic missiles we want to hit the target, and that is how accurate it is.

So I think, with the combination of capability with the LCS and the capability resident in the DDG 51, we meet the littoral challenge. I think that is where we are.

Mr. SAXTON. Mr. Chairman, if I may just follow up with one quick.

The shallow water sonar, is there a come-along to take up that capability?

Admiral MCCULLOUGH. Yes, sir. The LCS ASW mission package has the shallow water active and passive sonar capability. And I believe we roll the first ASW package out in September or October of this year.

Mr. SAXTON. Thank you, Mr. Chairman.

Mr. TAYLOR. The Chair recognizes the gentlewoman from Massachusetts, Ms. Tsongas.

Ms. TSONGAS. Thank you, Mr. Chairman, for allowing me to participate in this important hearing and for your continued leadership to make our shipbuilding more effective and affordable.

Admiral, I have a long question. Please, if you would, bear with me before answering.

Admiral McCullough and Ms. Stiller, you have both testified before Congress this year on the fiscal year 2009 budget and, in particular, on the DDG 1000 program. I would like to read a couple of your statements.

In April, Admiral McCullough, at the Senate Armed Services Committee Seapower Subcommittee hearing, you said, "It is, the DDG 1000, much more capable in the littoral, given the radar suite that we put on it, the signature reductions we have put into the ship, and it has got less than half the crew size on it."

In March of 2008, Admiral McCullough and Ms. Stiller, in your testimony before this subcommittee you said, "The DDG 1000 will capitalize on reduced signatures and enhanced survivability to maintain persistent presence in the littoral and future scenarios. The program provides the baseline for spiral development to support future surface ships. The dual-band radar represents a significant increase in air defense capability in the cluttered littoral environment. Investment in open architecture and reduced manning will provide the Navy lifecycle cost savings and technology options that can be retrofit to legacy ships, thus allowing adaptability for an uncertain future. The program continues to execute on cost and on schedule."

In March of 2008, in a hearing before this committee, "The DDG 51 is a very capable ship. That is true. I will tell you the capability that we put in the DDG 1000 with performance in the littoral, both against missile threats and to provide surface-fire support, exceeds the capability and the capacity that is resident in a DDG 51."

And Ms. Stiller, at the same hearing, "And I would also add that the fleets do have input as we go through our budget cycles and what the requirements are."

Today, obviously, you see a changed threat environment. Nevertheless, given all your testimony just three to four months ago regarding the great warfighting capabilities the ship delivers against current and future threats and its capabilities that "exceed capability resident in the DDG 51," do you stand by the testimony that you made before Congress so recently?

Admiral MCCULLOUGH. Ma'am, I would say everything that I said in my testimony, and I don't want to speak for Allison, remains.

The DDG 1000 is absolutely outstanding for the requirements to which it was designed. The dual-band radar is better than the SPY–1D(V) radar in the cluttered littoral environment at the sea/land interface. The 155 gun, the 6-inch gun, has a longer range and a better fire-support capability than a 5-inch gun.

The total ship's computing environment that I referenced again today is something we need to go forward with as we develop different combat systems, and we need that to complete the first two ships. The dual-band radar goes on CVN–78. I wouldn't change anything I said in that testimony. In that environment, the DDG 1000 outperforms the DDG 51.

Now when I look at developing multi-mission surface combatants that are filling a unique role that is aligned to one particular mission, which is fire support, and I look at the global change in the security environment, I have to look at where I think the capabilities should go. And the capability resident in the DDG 51 with respect to advanced anti-ship cruise missiles and ballistic missile defense better suits the capability challenges we see today.

Ms. TSONGAS. Before I go on to ask a question about the sudden shift in thinking around what the threat is, Ms. Stiller, you said that it is important that we do buy a surface combatant in fiscal year 2009. Given what the House Appropriations Defense Subcommittee did yesterday with $450 million for advanced procurement, no money for the DDG 51 procurement, and the fact that the Senate equivalent is likely to be friendlier to the DDG 1000, I am not sure where the funding for a DDG 51 is going to come from. Would you support funding for an additional DDG 1000 instead of no surface combatant in this year?

Ms. STILLER. Ma'am, as you know, our President's budget submission for 2009 included DDG 1000. And yes, Admiral McCullough said in his opening statement, we are here today to talk about where the Navy is headed and as part of our POM–10 submission to the Office of the Secretary of Defense (OSD).

So, from an execution perspective, yes, ma'am, I can execute a DDG 1000 in fiscal year 2009, but it comes back to a requirement decision; does the Department support and need that ship? But from an acquisition perspective, yes, ma'am, I absolutely could execute either way.

Ms. TSONGAS. And then I have one more question for you, Admiral. This isn't the first major ship acquisition program that has faced problems. Why does so much risk and inconsistency exist? Is this a problem with the threat assessment, or is it a budgetary issue? And what can we do to mitigate these problems?

Before you answer, I appreciate that we must be flexible, and I appreciate that you are under great constraints when you testify, but shifting testimony in such a short period of time makes it very difficult for us as a Congress to authorize and appropriate funding for long-term programs in an effective and efficient way.

So how do we address this so that the process is fairer for the Navy, for the industrial base, and the taxpayer?

Mr. TAYLOR. Ms. Tsongas, again, we are trying to clear the air, but you are over your five minutes.

So, Admiral, if you could give us as timely response as you could.

Admiral MCCULLOUGH. Yes, Sir.

Yes, ma'am, I understand the question. There have been some things that have happened in the near-recent past that have significantly changed the way we view the threat. Some of it I would have to talk to you offline about due to the classification level of it.

But if you look at recent ballistic missile demonstrations or tests by potential adversaries, they have advanced greatly since even 2000. And then if you look at an event that occurred in the Israeli-Hezbollah war where we used to attribute high-end or high-tech threats to nation-states, that would now affect our ability to perform what we previously viewed as operations in low-threat environments into a high-tech, high-threat environment. And so this is a requirements and capability issue based on the way we have seen the threat adjust over the past couple of years.

We started working on this about four and a half or five months ago, and I understand and appreciate the dilemma for the Congress. But the Navy felt that this was the right way to go based on the capability that we see we need to meet current and future threats.

Mr. TAYLOR. Thank you, Admiral.

Thank you, Ms. Tsongas.

The Chair, again, is going to recognize Members in the order that they were here at the gavel, and then we will go back to Democrat and Republican.

The next person who was here at the time of the gavel is Mr. Allen from Maine.

Mr. ALLEN. Thank you, Mr. Chairman. And I appreciate very much the chance to be here and welcome members of the panel.

Bath Iron Works in my district only builds surface combatants, so it has—and it was, my understanding was the third DDG 1000 was intended to go to Bath Iron Works. So this debate means a great deal to the people who work there, to the company, and everyone who is connected to that particular yard.

Both the CNO and the Secretary of the Navy have been to the yard. They have seen the new ultra-hull facility. They have talked about how important Bath Iron Works is to the shipbuilding industrial base in this country.

Ms. Stiller, I think you said that when you figure out the acquisition strategy, the industrial base considerations will play a role. I would ask either or both of you to speak to the role you see for that particular yard as part of the Navy's shipbuilding base going forward?

Ms. STILLER. Yes, sir.

Bath Iron Works is producing surface combatants for the United States Navy; specifically, still building the DDG 51 class and the lead DDG 1000 with some work also for the second 1000. There is a work-share agreement between Northrop Grumman Shipbuilding and General Dynamics Bath Iron Works.

Yes, sir, the Secretary has seen the ultra hull facility. I have been up there recently. That was an investment done through the

DDG 51 program to help improve efficiencies in the 51 program. Certainly the yard has improved efficiencies over time.

We will weigh industrial base considerations as we go forward in our acquisition strategy formulation. So I guess I can assure you that we will be considering that as we move forward. But I don't have specifics yet, because we are still in the developmental phase.

Mr. ALLEN. I understand, Ms. Stiller, that both yards have indicated to you that a restart of the 51 program in fiscal year 2009 can be executed.

Ms. STILLER. Yes, sir. As a result of my hearing this spring before this committee, Chairman Taylor asked me to talk with industry, because I had said I was concerned about the subvendor implications of returning to DDG 51. Both yards came in to meet with me. They had pulsed the subvendor base.

Now, I will tell you their assumption was the DDG 1000 continued and that the 51 would restart. The major issue that they identified to me was a long lead time for the main reduction gear, which would be about 50 weeks longer than what we have traditionally seen in reduction gear fabrication. Both yards assured me that since they had done main reduction gear repairs, significant disruptive industrial events, they have both done those in the recent past, they felt that if they understood that they were going to have to build out a sequence, they could plan for it and execute. And I believe knowing that they have done that in the past and they could plan in the future that, yes, sir, they could restart in 2009.

Again, they were in their assumptions, I am being truthful here, is that they did assume the 1000 class continued.

Mr. ALLEN. Admiral, I had one more question. As I heard you describe the capabilities of the 1000 and the capabilities of the 51, it struck me that what you were really saying is that the Navy's understanding of the national security needs of this country, particularly how we respond to future threats, has changed based on evolution and threats both in submarines built by potential adversaries and also by the development of new missiles, both cruise missiles and ballistic missiles. And I just was struck also in your written testimony how often you referred to the demands of the combatant commanders. And I wonder if you would elaborate just a little bit on that fact. What kinds of requests are you getting combatant commanders and how has that affected your decision?

Admiral MCCULLOUGH. As we reviewed the integrated priority list from the combatant commanders that were submitted this year, European Command (EUCOM) asked for increased air and missile defense. Pacific Command (PACOM) asked for enhanced ballistic missile defense. And Central Command asked for integrated air and missile defense. And I would have to get the lists; I don't have them in front of me. I believe PACOM asked for improvements in anti-submarine warfare. And as we looked at that, that sort of aligned with where we viewed the national security environment was going.

I would also tell you that EUCOM is coming in for a request for a 1.0 presence ballistic missile defense in the eastern Mediterranean. There has been some discussion in policy about putting that capability in the Baltic region. And Central Command has a stand-

ing request for forces for 1.0 presence for exo-atmospheric shooters, SM–3 shooters, and endo-atmospheric shooters, SM–2 block IV shooters, which is a near-term sea-based terminal. They have that standing requirement, as does PACOM, have a standing requirement for almost every ballistic missile defense asset we can put in that theater, sir.

Mr. ALLEN. Thank you.

Thank you both.

Mr. TAYLOR. The Chair thanks the gentleman.

And the Chair would also like to make a request of Admiral McCullough.

Admiral, included in next year's budget request, I would like the Navy to submit a cost estimate of what it would take when the first of the DDG 51s hit 20 years, what a service life extension program would cost to get those vessels electronically and weaponed-wise up to speed with the next 51s to come off the line.

Admiral MCCULLOUGH. What I would tell you, sir, is DDG 51 made its first deployment in 1991. So she was commissioned in late 1990 or early 1991. So she reaches 20 years in fiscal year 2011.

We put in a DDG modernization package as part of the President's Budget Request for 2008 (PB08) that was approved by the Congress to modernize not only the hull, mechanical, and electrical systems on that ship, of those ships, to get them to their full service lives, but to upgrade the combat systems capability, because as Congressman Bartlett indicated, if we don't—or maybe it was you, sir—if we don't get the ships to be able to upgrade to meet the threat, we decommission them. And we did. We decommissioned the Baseline One cruisers at about 20 years; the Spruances at about 22; and the new threat upgrade DDGs, 993 *Kidd* class, at 17 years because we couldn't upgrade the combat capability in them. And the upgrade packages we have in the combat systems, starting for the DDG 51, is something we call Advanced Capability Build 12. And that is a technical insertion of commercial off-the-shelf (COTS)-based computer hardware, and it is an open architected computer program that is developed around a projected architecture. And it gives the ships in-stride ballistic missile defense, the ones that don't have it, with multi-mission signal processors, and upgrades to the original radar that was put on the first ships, the SPY–D(V) capability, and it also puts in integrated air and missile defense with the cooperative engagement capability that isn't resident in that class of ships now and provides for increased extended range area air defense with SM–6s. And the cost of that whole upgrade, I believe, as submitted in the 2008 budget submittal was about $215 million a ship.

And we need to get to the open architecture computer environment so we can have an open architecture business base that allows competition for program algorithms and hardware updates, because we can't afford to upgrade these ships again 10 years after their current mid-lives at a cost of $200-plus million a ship. And so that is where that program is. And I can give you more details on that as you desire, sir.

Mr. TAYLOR. Admiral, for the record, I think that is very important. Additionally, given the advances in cathodic protection and metal coatings and what not, I think it would be very much to the

committee's interest as to, what are the possibilities of actually extending the life of some of these 51s out to 40 years?

Admiral MCCULLOUGH. Yes, sir, I can do that. We commissioned a study by Naval Sea Systems Command (NAVSEA) to get the ships to 40 years already, because, as I look at the outyear plan and the shipbuilding plan, I understand how expensive it is. And NAVSEA came back to me with that report. And there are no show stoppers to get those ships to 40 years estimated service life (ESL).

Mr. TAYLOR. Thank you very much, sir.

The Chair now recognizes the gentleman from Virginia, Mr. Wittman.

Mr. WITTMAN. Thank you, Mr. Chairman.

Admiral McCullough, you have spoken a little bit about the differences in capabilities of the DDG 51, the DDG 1000, the surface combatant commanders' requests and what their needs are. I want to kind of back up a little bit and talk in a broader framework as far as the threats that this Nation faces and in the Navy's vision of its mission needs. And can you tell us a little bit about that and how that has led you to the point of restarting DDG 51? How has the Navy's vision of the mission changed? And if you can speak a little more specifically about the Navy's role in providing ballistic missile defense and also Naval surface fire support and how those elements relate to the Navy's maybe change in thought about how the DDG 51 meets those requirements versus the DDG 1000.

Admiral MCCULLOUGH. Yes, sir. I will speak to that.

As we look at threat sets both from developing nations and nations that used to be constrained to regional operations, the proliferation of ballistic missiles is substantial. So that is a problem. And we have recognized that over the last several years, starting in the late 1990's or the early 2000's, when the Missile Defense Agency took auspices of capability development out of the services and under the agency. Prior to that time, the Navy had something known as the Navy Area Wide Program. So we were already embarked on what we saw an evolving threat with the proliferation of ballistic missiles.

Working with the Aegis Ballistic Missile Defense Directorate inside the Missile Defense Agency (MDA), the Navy has conducted successfully 12 of 14 engagements of medium-range and short-range ballistic missile targets out at the Pacific Missile Range Facility. We have also modified the program with the help of Lockheed Martin engineers, Raytheon engineers, the Naval Surface Weapons Center in Dahlgren, and the Navy, and executed a shoot down of an errant satellite because of the hazardous material that was in the fuel tank.

The most recent exercise off of Kauai in November of 2007 was conducted, as we do all of them, the ship's crew is on watch; it is not engineers. It is not specified folks. It is folks on a watch bill, without knowledge of when the target is going to be launched, and they launched two simultaneous short-range ballistic missiles, and they were successfully intercepted by *Lake Erie*.

So we have the capability to conduct intercept operations today with the Aegis Ballistic Missile Defense Program 3.6 or 4.0. That capability is deployed in the Western Pacific and contributes to the larger ballistic missile defense system architecture that has been

engineered by MDA to provide warning for rogue nation ballistic missile launches. And it is on station and operational today, and the combatant commanders want more of it, sir.

Mr. WITTMAN. Thank you.

Mr. Chairman, one additional question. When the DDG 51s were in production, there were a minimum of three DDG 51s produced per year. And past studies have indicated that the shipbuilding industry needs to produce at least three of those surface combatant ships a year in order to sustain the industrial base. Now, with this change in direction from the DDG 1000 to the DDG 51, does the Navy plan in future budget requests to request the production of at least three DDG 51s per year into the future?

Admiral MCCULLOUGH. Sir, what we have proposed to OSD as we have worked through this plan is eight ships across the fiscal year 2010 Fiscal Year Development Plan (FYDP). And the profile as proposed, and not approved yet by OSD, is one ship in fiscal year 2010; two ships in 2011; one in 2012; two in 2013; and one in 2014 and 2015. As we build subsequent programs in the years to come, we will look at that issue that you just laid out. But I would tell you right now, based on competing demands within the Department, that is what we laid in the POM–10 submittal to OSD.

Mr. WITTMAN. Thank you, Mr. Chairman.

Mr. TAYLOR. I thank the gentleman.

The Chair intends to recognize in the following order: Mr. Langevin, Mr. Ellsworth, Mr. Sestak, Ms. Gillibrand, and Mr. Cummings. If our minority members wish to be recognized along the way, just let me know.

The Chair now recognizes Mr. Langevin for five minutes.

Mr. LANGEVIN. Thank you, Mr. Chairman.

And I want to thank you for your courtesy in allowing me to come back on the committee for this hearing, as I am on leave from the Armed Services Committee, on the Intelligence Committee right now.

Admiral, I want to thank you for your testimony.

Ms. Stiller, thank you for being here as well.

Let me just say that I am certainly concerned about the quick shift in strategy, going from the 1000s to the DDG 51s, given all the due diligence that has gone into getting us to the point of the recommendation of the shipbuilding on the 1000s, especially given the fact that the President's budget seems to be going one way. As I understand it, the Sec Def has not signed off on Navy's plan. The House Defense Appropriations Subcommittee has recommended $450 million for the DDG 1000 and nothing for the 51s.

In your testimony, you stated that the decision to suspend the *Zumwalt* in favor of more *Arleigh Burke* class destroyers resulted from the Navy's belief that the DDG 51's capabilities better met the Navy's needs. Considering the Navy is certainly requesting a change in the President's budget six months after its submission in the middle of an appropriations cycle, you know, I certainly am curious about how this decision was made by the Navy.

You stated in your testimony that there was significant change in threat assessments that prompted the review. You know, I would like to follow up with you, perhaps in a classified session or

in response to my questions in writing, in addition to what you have stated verbally already on what the change in the threat is. Additionally, as you know, and have stated in the past, the DDG 1000 was developed as a result of an extensive review on budget, design, and capabilities. Did the decisions to suspend DDG 1000 and replace it with DDG 51 undergo a Joint Capabilities Integration and Development System (JCIDS) Review? And can you please provide for the subcommittee a copy of that study for the record?

[The information referred to can be found in the Appendix beginning on page 131.]

Admiral MCCULLOUGH. As far as the JCIDS process, my initial liaison with the Joint Staff has said there is no—they don't have a requirement for us to update the capabilities development document that was approved by the Joint Requirements Oversight Council (JROC). I do understand that the Vice Chairman of the Joint Chiefs of Staff is going to ask that the Navy come and brief the JROC on why we had the shift from DDG 1000 to the DDG 51s.

Mr. LANGEVIN. So, Admiral, this decision was made absent a thorough review, analysis, and study?

Admiral MCCULLOUGH. We have done the analysis and study internal to the Navy. And we do it with our analysis shop N81. I also will tell you, when the CNO came into office last September, he has come with vast experience in the Pacific, both as a deputy Pacific commander for approximately a year, the Pacific fleet commander for two years, and the Atlantic fleet commander for some period of time, six or eight months. And when he started to go through our program build for fiscal year 2010, based on his experience and where we saw the threat set going based on our analysis, long about the beginning of March he said to me that we really need to go look at this; I think we have an asymmetric capability mismatch between the projected and future threats and what we are building. Our internal analysis says we have excess capacity in Naval surface fires that the DDG 1000 was predominantly designed for and that we have the capacity to support the Marine Corps surface fires requirements. And so given his experience and what our analysis said, starting in about March, we started to work this process. We wanted——

Mr. LANGEVIN. Admiral, if I could, my time is limited, so if I could ask, it is my understanding that the CNO has not in fact signed off on Navy's recommendation transitioning, going back from the 1000s to the 51s. Is that correct?

Admiral MCCULLOUGH. It is in our budget submittal. Deputy Secretary of Defense and the Under Secretary for Acquisition, Technology, and Logistics, Secretary Young, said the Navy could provide this as part of their POM–10 submittal, and that we should start to brief Congress and industry. And the CNO and the Secretary have made calls Members, and Ms. Stiller and I have made calls on staffers, because we wanted to get to the Congress before you all found out about it in the newspaper. So the POM–10 submittal is under review by the Office of Secretary of Defense, sir.

Mr. LANGEVIN. Thank you. On the design changes and such, in your testimony, if we do the 51s versus 1000s, you estimate that the DDG 51 line could be restarted you said in fiscal year 2009

even though you also know that certain industrial base issues need to be worked out. You said, given the long lead time for materials, such as the main reduction gear, you said—I was going to ask if you thought that 2009 was a feasible estimate. You still believe that that is correct?

Ms. STILLER. Yes, sir.

Mr. LANGEVIN. Okay. Well, you have stated that the new——

Mr. TAYLOR. Mr. Langevin.

Mr. LANGEVIN. Yes.

Mr. TAYLOR. We are going to let you go a little bit over, but in fairness to the other members, you are past your five minutes.

Mr. LANGEVIN. Thank you for your indulgence, Mr. Chairman. I will be brief with just this last question.

You stated that the new DDG 51s could incorporate additional technologies, but we haven't heard a clear explanation as to what those would be. Do your cost estimates for the future DDG 51s reflect current design and capability or do they incorporate additional technologies, each of which could lead to insertion or new design costs?

And finally, do your lifecycle comparisons between DDG 51 and the 1000s incorporate the increased personnel required for the 51s? And have you developed estimates of termination costs for DDG 1000?

Admiral MCCULLOUGH. Sir, the capability set I described for DDG 51 that would restart as DDG 113 is based on the modernization program that we currently have funded in the DDG modernization program. And that includes the COTS-based computer hardware, the open architected computer program, the multi-mission signal processor with inherent ballistic missile defense capability and the extended-range anti-air warfare capability with SM–6. That combat system, because of the way it has been developed, costs less than the current combat system that is in DDG 112. That will be available to drop into DDG 113 if it is a 2009 restart. So I am confident in the cost numbers that we have provided in letters to what the restart costs for a DDG 51 is. Lifecycle costs, because the DDG 1000s are projected to come on service or in service inside this POM–10 developed fiscal year 2010 future year defense plan, we used the N4 as models on how we project costs for ops and maintenance and manpower on DDG 51s and the DDG 1000s. And when we look at manpower and fuel costs and spare parts, a DDG 51 over the lifecycle is about $4 million more expensive to operate than the DDG 1000. I will get you the exact number, but I think it is $4 million. That is different than what is in the Selected Acquisition Report because the SAR reflects different requirements for lifecycle costs than we do when we do budget development for ops and maintenance and manpower on ships.

Mr. LANGEVIN. I know my time has long since expired, so I want to thank the chairman for his indulgence.

Admiral and Ms. Stiller, I will have follow-up questions that I would like a quick response for the record.

Thank you.

Admiral MCCULLOUGH. Yes, sir, thank you.

Mr. TAYLOR. The Chair thanks the gentleman.

The Chair recognizes the gentleman from Indiana.

Mr. ELLSWORTH. Thank you, Mr. Chairman.

Thank you, Admiral and Ms. Stiller, for being here. I will try to keep mine brief. Admiral, is this, in your vast experience, the first time this has ever occurred, we canceled a program midstream, in your years in the Navy? In the Navy or any of the other armed services?

Admiral MCCULLOUGH. First, sir, I would like to just make one correction. We are not canceling the program. We are truncating the program at two ships. And those will be developed and fielded both to demonstrate the technology and to use in operations. Allison and I just talked for a minute, I have been in the Pentagon for about 3 years, and I have been commissioned for a little over 33 years. And the only other major program I can remember that has been canceled was the A–12.

Ms. STILLER. From a truncation perspective, and not necessarily the Department, but the *Sea Wolf* (*Sea Wolf* class fast attack submarine) program was truncated, first, at one submarine and then two and finally three.

Mr. ELLSWORTH. And Ms. Stiller, I know you are the expert in percentage of the work being done, we have talked before, the two ships that we have contracted, and I have not had a chance to review the documentation, at what level, what percentage are they in construction? Are they done? Are they at zero?

Ms. STILLER. No.

Sir. We awarded the contracts for the dual lead ships in February of this year. And the plan, Bath Iron Works has the lead ship. We had always said we wanted to get to a certain point in design before we started construction. That is about 80 to 85 percent. And they intend to start fabrication on the lead ship up north in October of this year and about a year later down south. So we have not started production, although both yards have taken the design products and translated them into usable modules that will go into the ship to prove that the digits-to-steel translation works. And I am happy to report it has worked incredibly well. The program is going quite well, cost and schedule. DDG 51 is likewise a very successful program.

Mr. ELLSWORTH. So we will produce two only of the DDG 1000s. Is that——

Admiral MCCULLOUGH. That is the Navy's plan as submitted to OSD, yes, sir.

Mr. ELLSWORTH. And when that occurs and when these ships are fully operational, then, Admiral, would you tell me the difficulties or challenges down the road with having 2 of one and 33 of another, whatever the number is, of the 51s? How does that challenge you in the training, replacement parts, running two ships only? What are the challenges you will face in that?

Admiral MCCULLOUGH. Well, any time you have a small class, you have economy-of-scale issues. So you get a lot of DDG 51s, you have one set of issues. When you have a small class, you face another set of issues. That said, I will tell you the Navy has a history of small ship classes, and we know how to deal with it. The *John F. Kennedy* was a one of a class. The *Enterprise* is one of a class. There were two *California* class cruisers. The there were four *Virginia* class cruisers. There are three *Sea Wolf* submarines.

Which ones did I leave out? Oh, *Bainbridge* is one of a class. *Truxtun* is one of a class. *Long Beach* is one of a class. So there are challenges, but we have the experience to deal with it, sir.

Mr. ELLSWORTH. Thank you, Mr. Chairman. I will yield back.

Mr. TAYLOR. The Chair thanks the gentleman.

And for the record, Mr. Larsen has asked for a breakdown of the lifecycle costs of the two vessels to be submitted for the record.

[The information referred to can be found in the Appendix beginning on page 131.]

Mr. TAYLOR. The Chair now recognizes Admiral Sestak from Pennsylvania.

Mr. SESTAK. Thanks, Mr. Chairman.

About three years ago, CNO Clark came before this committee and said that, if we do not preserve the DDG 1000, we would be putting at risk the sons and daughters of our Nation. For some reason that seemed, understandably, potentially to handcuff the Congress. We took him at his word, or they did.

Why is your credibility any better today to tell us it is not needed and that something else can replace whatever it was that put our sons and daughters at such risk?

Admiral MCCULLOUGH. Congressman, I respect Admiral Clark immensely. And when he testified before this committee, given what we knew of the world situation at that time, I think he was absolutely correct.

Mr. SESTAK. What did you get to replace whatever DDG 1000 was supposed to do to protect the sons and daughters? Not that the threat has changed. What has taken its place to do that? Because the analyses we had over there said the other ones couldn't do it, that led him to state that. What is taking its place to do that?

Admiral MCCULLOUGH. The surface fires analysis, first, I have to brief you in another environment. But I would tell you that the capacity that the DDG 1000 brought in the surface fires for which the ship was designed is easily accounted for by the improvements in airborne-delivered precision strike munitions, tactical Tomahawks today as well as our current——

Mr. SESTAK. If I could, Admiral, those analyses were also—and there has been no changes in those programs of record since he made that statement.

Admiral MCCULLOUGH. Congressman, to adequately——

Mr. SESTAK. With all due respect, there has not been.

Admiral MCCULLOUGH. Yes, sir. But to adequately get at your question, I have got to take it into a classified environment. I can't discuss it here.

Mr. SESTAK. But if I could, I understand that something has moved to the left. I am not arguing that point. I am arguing what is taking the place of DDG 1000, that it was the only thing that could meet this need? It was the only thing that could meet this need. Not the new threat.

Admiral MCCULLOUGH. Yes, sir.

No, that is the surface fires requirement.

Mr. SESTAK. My understanding is that was not just what he was talking about, because there is also—my second question is, to some extent, the Navy had tried to evolve over the past years not to be a Navy of a man but to be a Navy of analysis. Where is the

area of analysis (AOA) for this proposal of yours? Where is the AOA for the CG(X), the DDX—excuse me, I am sorry—DDG 1000 was supposed to take us to? What about the electric drive that was to lead to the electric magnetic gun? And the global war of terror, which Secretary Gates came out today and said that is the future for the next decades. And DDX wasn't just meant for Korea, it was meant to go—DDG 21—to go around with the electromagnetic radar gun (ERG) everywhere, to reach into those countries with that, not just Korea, but the concept for the Navy was to contribute to the global war on terror. Are we making a strategic decision today on one ship? Where is the analysis, the strategic thought, the studies and the cost studies that will show, is this really the way to go, or is there a different change or a better approach? I don't think we have seen those.

Admiral MCCULLOUGH. We have significant analysis on the surface fires requirement, not only for the campaign but elsewhere, that says——

Mr. SESTAK. But this was also—I understand surface fires. But we have also taken this ship down from 1,200 rounds to 600 rounds, from 120 VLS tubes down to 80 VLS tubes. We decremented over these past years that surface fire support. But it was the other things, the stealthiness of it, the range, the ability to go with the ERG and the electromagnetic gun and what it boded for the future. What has replaced those?

Admiral MCCULLOUGH. I will tell you we will continue to develop the integrated electric power system for use in future surface combatants. I would also tell you the closest thing we have with electric or electronic warfare, electromagnetic warfare is the electromagnetic rail gun that is being demonstrated in Dahlgren. And I don't see any potential to weaponize that before about 2020. And I would say that the technologies incumbent in the DDG 1000 for the fire suppression systems, et cetera, are very applicable to any future surface combatant and backfittable—if that is a word—we can backfit them into current surface combatants when they are modernized.

Mr. SESTAK. Could I ask another question on cost, because I don't have much time? If you go through the various costs that you have had in things like BMD upgrade costs in your President's budget, or the radar upgrade costs on the *Zumwalt* presentation in NAVSEA in February of 2008, and I can give you the rest of the documents; when you work out the figures, those costs that the Navy has provided, it appears that if you wanted to have a baseline DDG 51 restart, that the cost, according to your figures, would be about $3.1 billion, with an SPY–1D with BMD capability versus dual-band radar (DBR) with BMD of—for the *Zumwalt* of about $2.6 billion. Then if you bring it to the 15-plus decibels (db), the cost is about $4.8 billion for the DDG 51 restart and about $3 billion to get to plus-15 for the *Zumwalt.* My question is not that these figures are right or wrong. Why are your figures today correct, but these figures from your documents aren't in the past? What has changed in the costing of these radars and these combat systems? Because, again, I think it goes to the credibility of coming forward today and saying, which you did, Admiral, it is going to be

unaffordable with the *Zumwalt*; yet just back in February, we were saying it was affordable.

Ms. STILLER. I guess I would say that this decision is based on the requirement and a threat, not an affordability decision. But back to your numbers——

Mr. SESTAK. Are we making this decision not based upon affordability today? Is that what you are saying?

Admiral MCCULLOUGH. Absolutely.

Mr. SESTAK. So then why not go with the *Zumwalt,* since you don't care about affordability? You told us earlier in the testimony that you cared about affordability, that it would be unaffordable was your exact words, which was part of the reasons you weren't going to go with *Zumwalt.*

Admiral MCCULLOUGH. I said it would be unaffordable to upgrade the *Zumwalts* to the capability we need. Congressman, I don't have the numbers in front of me that you do.

Mr. SESTAK. Admiral——

Mr. TAYLOR. Admiral, we have been generous to everyone on the time. But we need to be fair to some other folks.

Mr. SESTAK. I guess my only comment, after having watched AOAs and studies and capabilities and credibility is, wow, we are turning on a dime. For a nice niche, I understand that capabilities move to the left. But what is filling the rest of the gap? And where are the studies attendant to that strategic approach and the credibility of the numbers to support it?

Mr. TAYLOR. The gentleman's time has expired.

If I may, Admiral, the Navy may say that affordability is not a question. In fairness, in this room, it is obviously very much a question. I don't recall before the full committee anyone saying, let's take some money from missile defense and put it into ships. I don't recall anyone saying, let's take money out of aerial tankers and put it into ships.

We have got, approximately, throughout the National Guard they are at 60 percent of their equipment. And I don't recall anyone saying, let's take it out of the National Guard and put it into ships. And again, we are wrestling with about a $13 billion shipbuilding account that has been frozen for about 5 years. And even though the Defense budget has grown by $100 billion on President Bush's watch, the money for shipbuilding has remained frozen, and the fleet has actually shrunk. So, obviously, we live with some constraints the Admiral does not. And again, in fairness, I just think that, until we hear the other subcommittees and the other subcommittee chairmen coming forward and saying, here, have some money, we have got to do the best we can with what we have.

Having said that, I would like to recognize Ms. Gillibrand.

Mrs. GILLIBRAND. Thank you, Mr. Chairman.

I want to continue some of the lines that my colleague, Mr. Sestak, started. Did you do a comparison of cost studies between how much it would be to retrofit or to improve the 51s with the technology that you had specifically developed for the 1000s?

Ms. STILLER. Over time, over the years we have been asked the question about the 10 engineering development models that were developed for—that are developed for DDG 1000, and could they apply on DDG 51?

Mrs. GILLIBRAND. Right.

Ms. STILLER. Of the 10, there were 3 that we have looked at very hard. One was dual-band radar. It will not fit on DDG 51. We understand that. We looked at installing the gun, the advanced gun system. And that is achievable from a Naval architecture perspective. The magazine would be significantly smaller than what you have on DDG 1000.

Mrs. GILLIBRAND. And did you run the cost for the cost of the gun on that?

Ms. STILLER. We did cost that, but I don't have those figures. I can get those to you. And we also looked at putting the integrated power system on DDG 51. You can do that. There would be some speed penalties. So that would have to be a requirements decision on whether we would backfit that in the modernization program. But we have looked at that in the past. And those were the three technologies that we thought had the most promise to go on DDG 51.

Mrs. GILLIBRAND. So 3 out of 10 can be transferred. And haven't you spent $10 billion on developing the 10 technologies?

Ms. STILLER. We spent—our total program to date, from 1995 to today, and we have about $13 billion invested. Some of it is research and development (R&D), as you mentioned, and some of it is the shipbuilding and conversion (SCN) to buy the lead ships.

Mrs. GILLIBRAND. So if those additional seven technologies were developed because of certain requirements that we had, how are you going to meet those requirements if you can't utilize those seven technologies?

Admiral MCCULLOUGH. Ma'am, as I said in my testimony, there are some things associated with the reduced manning initiatives in DDG 1000 that we will continue to look at for application both in back fit and forward fit. I spoke specifically of the fire suppression systems, which automatically reconfigure fire mains and put fire mains out and allow you to reduce manning, as well as the flight deck fire-fighting system. Ms. Stiller spoke of the advanced gun system.

As I look through the list of technologies that I have that we have spent money on for DDG 1000, the peripheral vertical launch system and advanced VLS has applicability potentially for back fit, but for definitely forward fit into CG(X). As I look at integrated composite deck house and apertures that we tested in the desert, that definitely has applicability to CG(X). The infrared suppression, we could fit if we decided we needed that. The integrated power system is available for future fit and back fit, as Ms. Stiller just said. I spoke to the fire-fighting systems. We think development of the total ship computing environment is important. It needs to be completed to make the DDG 1000s operational. And we will look at that computing program as compared to other computing programs and decide which way is the best way to evolve Navy combat systems. The hull form scale model, we want to take the ship to sea and see how the different hull form operates in a real environment. The only one that I cannot see at this time is the total undersea warfare system. Now there is a mine avoidance piece of that that we would definitely look at.

Mrs. GILLIBRAND. Okay. So what you are saying is that, of the seven technologies that you can't use with the DDG 51s, you are hoping to use them in the next generation of shipbuilding——

Admiral MCCULLOUGH. Absolutely.

Mrs. GILLIBRAND [continuing]. With the CG(X)s. So you are going to skip a generation, but you are going to spend all the taxpayer money building 51s that don't have these capabilities that clearly we had requirements for or you wouldn't have devised them.

So it seems to me we are wasting money investing in the DDG 51s if they don't have the technology capabilities that we need, and we are going to in fact use those technologies, but we are going to have skip a whole shipbuilding generation to do it.

Admiral MCCULLOUGH. There is a lot of technology that was put in the ship because of Naval architecture constraints and some things we were trying to do to reduce manning. The reduced manning initiatives we will push as fast as we can. But what we are saying to the Congress today is this is a capability mismatch with the way we see the threat going.

Mrs. GILLIBRAND. So you are saying we don't need those seven technologies.

Admiral MCCULLOUGH. No, ma'am, I didn't say that. We need the technologies to take forward. There are some we can use as backfit into DDG 51. The capabilities to combat capabilities we see today based on the current and projected future threat is more suited by DDG 51. We need the technologies to take surface combatants forward.

Mrs. GILLIBRAND. Okay. So your testimony at the end of the day is that the DDG 51s meet the current needs, threat requirements, than the 1000, than the DDG 1000.

Mr. TAYLOR. Ms. Gillibrand's time has expired.

Admiral, if you would please answer the question.

Admiral MCCULLOUGH. Yes, ma'am, that is correct.

Mrs. GILLIBRAND. Thank you.

Admiral MCCULLOUGH. Yes, ma'am.

Mr. TAYLOR. The Chair recognizes the gentleman from New Jersey. He will be followed by the gentleman from Massachusetts and then the gentleman from Virginia, and then we will wrap this panel up and move on to the next panel.

Mr. SAXTON. Admiral, I have spent a fair amount of my time here on the committee dealing with the Special Operations Command. And one of the strengths of the Special Operations Command is that they are able to identify threats in real time as they change and adapt their operating procedures to deal with those threats. A good example, non-Special Operations Command, of changing threat occurred beginning in 2001–2002 when we had to deal with the improvised explosive device (IED) problem. We are still doing that. In order to deal with that problem, we immediately or almost immediately established an IED task force to adapt special procedures and make recommendations to this committee as to how we could protect the lives and the health of men and women who were subject to IEDs. So we understand that threat changes. And you have said that multiple times here today.

In the notes that we have from the Navy, there is a paragraph here that says: We must consider the evolving security environ-

ment in which we operate. Given the changes in potential threats and the developing capabilities of potential adversaries, we are making this move in order to avoid a threat-to-capability mismatch.

Could you just specifically, as specifically as you can, say how the threat has changed and how you believe the decision that you made will best meet that threat?

Admiral MCCULLOUGH. There are three specific areas. One is with the increased proliferation of ballistic missiles that provide anti-access challenges to our forces today globally, not only the high end threat posed by potential adversaries in the Pacific but lesser included capabilities in the Arabian Gulf region, in Northeast Asia, and the ability—or the proliferation of that threat globally. So the ballistic missile threat is the first piece.

The second piece is when you see a high-tech threat capability that is usually resident in a nation-state come off the beach in a conflict against a non-state actor and strike a warship and do significant damage to it. It is, where is that capability going to go next, with what potential non-state actor? And that happened in the eastern Mediterranean in 2006. And I will tell you there are nations that are developing quiet diesel submarine technology and putting it into blue water to challenge where we operate. And we need improved capability against the open-ocean deep-water quiet-diesel submarine threat. And that is where we see the capability that has come rapidly left from where it was projected. I don't think anybody ever envisioned Hezbollah being able to launch a C–802, and they did that quite well.

Mr. SAXTON. Well, thank you, Admiral.

And before my time expires, let me just congratulate the Navy on getting the *Freedom* underway here in the last week or so. That is a good accomplishment.

Admiral MCCULLOUGH. Thank you, sir. We were very pleased with how the builders trials are going on that ship. And it was nice to see pictures of her underway, making way with no land in sight.

But thank you.

Mr. TAYLOR. The Chair recognizes, again going back to our initial motion to allow people who are not members of this committee to speak, the Chair recognizes the gentleman from Massachusetts, Mr. Kennedy—gentleman from Rhode Island, my apologies.

Mr. KENNEDY. Thank you very much.

I appreciate the opportunity to say a few words. Thank the Chair.

What I am interested in is obviously getting to the analyses for the costs, because obviously we have seen the Congressional Budget Office (CBO) and Government Accountability Office (GAO) come up with very differing costs. And as the chairman said, we have to consider the costs as much as you say that this is about mission. So we really need to get those costs, as much as you said you don't have the detailed analysis in front of you, I mean, it is really crucial for us before we make these decisions.

Admiral MCCULLOUGH. Sure.

Mr. KENNEDY. And frankly, when you are looking at retrofitting, you know, DDG 51; when you are looking at reduction loss; and timing is money; and how much you are factoring in your ability

to retrofit that without any loss in time; being able to get those supply schedules up; do all of that and keep to a cost schedule when you have already got, you know, DDG 1000 in the pipeline with the schedules in line and with costs coming down, given the fact that all your, you know, cost redundancies have all been embedded in the first ship, and we are starting to see that come down. I mean, obviously, trying to compare last ship in the last class with the first ship in the new class is comparing apples and oranges. And you know, we know that the first *Zumwalt* is a very expensive ship, but it is obviously embedded with redundant costs that aren't going to be seen in a future ship. And we are buying, you know, a whole generation of new, you know, technologies for all the future oncoming generation of cruisers and the CV(N). As you pointed out, these new technologies are going to be applicable in other platforms. So I think we have to get all of this in proper perspective. And it would be really helpful to us if you did that.

I think the concern is, you know, we have got open architecture with the *Zumwalt,* and yet we don't with the old Aegis system. And you know, how do you begin to retrofit an open system with a closed system? And obviously, that is not something you can really do. And so this begs some questions in terms of industrial base, you know, that I am concerned with. And then, in terms of the—from what I understand in terms of the BMD threats, you know, I am not certain that the case has been clearly made to me that retrofitting DDG 51s is necessarily less cost compared to upgrading the 1000s. I mean, you know, like I said, you are still having to re-up the—you know, doing it one way versus the other still needs to be presented to me. We still haven't been given the proper analyses. And I think we deserve to get these analyses really put in front of us and the historic data and all of this because, you know, we are all being given information from various sources, and I don't think we are getting it all clearly put to us.

So I would really just ask those from this panel and the next panel to be giving us the straight information so that we can all work off the same sheet of music here. That is the only way we can go about making our decisions without making them in the vacuum. And that is the reason why I am here, is because, you know, obviously, we want to make these decisions. We are talking about costly decisions if we don't make the right ones. And you know, capabilities are very important. And we really want to make sure we have the right capabilities. And putting, you know, new weapons systems on old ships, we want to make sure that—from what I have been told, that doesn't make a lot of sense because it doesn't work. You know, trying to retrofit modern technology with old systems doesn't really necessarily work. And we are looking at new threats. Well, how do we incorporate the new technology to meet those threats? So I know a lot has been discussed today, and I am here to listen and learn, but I am anxious to also get all the information that you said that you are going to provide this committee as well.

Admiral MCCULLOUGH. Yes, sir, we will be glad to provide that level of detail on cost and also the technological path. And I would say that your reference to open architecture in the Aegis system, the older Aegis systems, are closed. It is all proprietary Lockheed

Martin. With the Congress's help, the Navy has spent a lot of money to get the system to be open architected so we can publish it in our library, and all the interface standards are known by all the corporations that allow free market competition for upgrades to both the hardware and the software piece of the program. But we will be happy to provide you that detail, sir.

Mr. KENNEDY. And you know, that obviously is going to save the government money in the years ahead. But time most of all because you can, you know, be able to move in and out new systems as the open architecture will allow. And obviously, we are anxious to reduce the time delays and move the best and the brightest folks to be able to take advantage of the latest in technology and give it to our people in the field ASAP when it becomes available. So it is a big benefit of what our last moves have been in terms of this, you know, DDG 1000. And that is the aspect of it that we don't want to lose if we are talking about different hulls.

Mr. TAYLOR. Mr. Kennedy, if you can, wrap it up, please.

Mr. KENNEDY. Okay. If you can't retrofit the old hull with the new technology, what happens to the new technology is what I am asking you.

Admiral MCCULLOUGH. Yes, sir. We will provide you that information. And then, one thing, when I said this is a capabilities-based decision on the part of the Navy, I don't mean to ever imply that we don't look at the cost based on affordability. Because we are very gracious of the money that the Congress provides to operate and maintain the Navy. So when I said it was a capabilities-based decision, that is what drove us, but we are very conscious of how much things cost. And I will be glad to get you the information on the costs and details as well as the technology flow.

[The information referred to was not available at the time of printing.]

Mr. TAYLOR. The Chair thanks the gentleman.

The Chair now recognizes the gentleman from Virginia, Mr. Wittman.

Mr. WITTMAN. Thank you, Mr. Chairman.

Just one more question for Admiral McCullough. Again, getting a little more general, broad in scope, there has obviously been some challenges in the costs, rising costs of our shipbuilding programs. I was wondering, has the Navy or the National Shipbuilding Research Program (NSRP) explored different software applications, such as the COTS software or other technologies, that might enable these efforts to be a little more cost-effective both in the design, engineering, and manufacturing of the vessel? And another part of that question, is I know the Sec Nav and CNO often cite best practices and lessons learned from foreign shipyards. And can you tell us a little bit about how those best practices might succeed here in the United States? And are we able to apply those similar practices or technologies here?

Ms. STILLER. Yes, sir, the National Shipbuilding Research Program that you talked about has been in place for quite a while now. And it has evolved over the last couple of years where we wanted more stakeholder involvement in the process. So the program executive officers that buy the carriers and the submarines and the surface ships for the United States Navy have an active

role with industry to define what projects ought to be explored, where they see there would be benefit on programs that are coming up or in process. So I would say that is a very well run program and has really afforded us a lot of opportunities. As for where can we learn from the foreign yards and how they have become efficient, each of our shipbuilders has gone and benchmarked other yards. And we have also had an OSD study that benchmarked our yards versus the European and Asian shipyards and has found, from 2000 to 2005, there has been improvement in our U.S. yards in certain areas. So I think you can see the improvements as each of the yards has brought them in and put them into their processes. So, yes, sir, we have certainly seen leveraging their experience into our shipbuilding programs.

Mr. WITTMAN. Thank you, Mr. Chairman.

Mr. TAYLOR. Thank you.

And I, hopefully in fairness to all concerned, have waited until last. And I very much appreciate all of the questions.

We have been very generous in the time. We probably are going to stick closer to the five-minute rule in the next round.

But a couple of observations. In the lead-up to the budget vote of May the 9th, 2001, President Bush would repeatedly go on television and say that some economists worried about us paying down the debt too soon. I would like to find that economist. He said that we could spend more, collect less, and somehow balance the budget. We are $4 trillion deeper in debt than when we took that vote.

Since that time, in fairness, Congress has passed a huge prescription drug benefit bill, very expensive. We have been involved in two very costly wars, both in human lives and in dollars. We have had at least seven hurricanes hit our country. Midwest floods, tornadoes, and a lot of very expensive things happened.

What this committee has to do is struggle with the reality that neither of the Presidential candidates is proposing a substantial increase in the shipbuilding budget, and that every ship that is proposed is a great ship. The question is, where is the money for these ships going to come from?

Ms. Stiller, not that long ago, one of your colleagues, and a man I consider to be a great national resource, Mr. Young, made a statement before the Senate Armed Services Committee that he felt like if we were to continue the DD 1000 program that at some point the price would come down to about $2.6 billion per ship. We sent the Department and Mr. Young a letter about a month ago saying that if he could find any contractor anywhere in America who would commit to that firm price for follow-on vessels of the DD 1000, that the committee would drop its objections to the third vessel.

Now, we have had a month, and we have had a heck of a lot of time for the two potential vendors to take a look at it, come back to us with a firm, fixed $2.6 billion price. Have either of the contractors stepped forward with that contract?

Ms. STILLER. Sir, I am not aware if they have.

Mr. TAYLOR. Admiral, you strike me as a very smart man, so I am going to ask you a fairly simple question. At the moment, what does the Navy project the cost of a DD 1000 to be when they are delivered, the first two?

Admiral MCCULLOUGH. About $3.2 billion, sir.

Mr. TAYLOR. What did the Navy project the cost of the LCS to be?

Admiral MCCULLOUGH. Basic construction costs were projected to be $220 million when we started the program.

Mr. TAYLOR. And the cost of that fairly simple warship is now expected to be?

Admiral MCCULLOUGH. About two and a half times that, sir.

Mr. TAYLOR. About two and a half times, for a fairly simple, what was intended to be a fairly simple low-cost alternative to ships. Given that, what degree of confidence do you have that that the DD 1000 will be delivered at $3.5 billion?

Ms. STILLER. Sir, I have a tremendous amount of more confidence than what we saw in LCS. As you well know, the Naval Vessel Rules were in development when we were in design on LCS. That is not the case on DDG 1000. Naval Vessel Rules were approved and in place. As you know, we started construction on LCS vessels before the design was barely started. And as I said earlier, in the case of DDG 1000, we will be 80 to 85 percent complete with the design before we go into construction. I am not going to tell you there won't be challenges on lead ships. There always are. But I don't see us set up in the same way that we were on LCS on this program.

Mr. TAYLOR. So you are telling me you have a fairly high degree of confidence it is going to be delivered at $3.5 billion?

Ms. STILLER. Sir, the contract—yes, sir. It is $3.2 billion, but yes, sir, at this point in time, I see no reason to say we won't be able to deliver. The companies, we awarded the contracts, they feel like they can deliver for that amount of money. So I am fairly—I am very confident at this point. But the dynamic is, what is the future surface combatants, and what is behind it? And that is important to the yards as well.

Mr. TAYLOR. The goal, the minimal size articulated by the Navy for the surface fleet is what?

Admiral MCCULLOUGH. It is 88 surface combatants plus the 55 LCSs, I believe, is what was in the 2009 shipbuilding plan.

Mr. TAYLOR. But the total number, and I think it was first articulated by Admiral Clark when he was CNO and repeated by Admiral Mullen and repeated again by Admiral Roughead, your goal is how many total ships?

Admiral MCCULLOUGH. Admiral Roughead refers to it as a force structure floor of 313 ships. Admiral Mullen referred to it as a 313-ship force structure plan. So 313 is the minimum number of ships, with a maximum acceptable risk that we believe we need.

Mr. TAYLOR. And just to walk the people of this Nation through this, the fleet today is approximately 290?

Admiral MCCULLOUGH. 280 ships, sir.

Mr. TAYLOR. 280 ships. So to get to 313 would require approximately how many ships to be built each year, and how long for each of those ships to remain in the service?

Admiral MCCULLOUGH. Design service lives (DSLs) vary, and the program is laid out to recap based on the service lives of the ships. For example, combatants are about 35 years. Aircraft carriers are 50 years. And so we program recapped it to maintain the force

level at the right capability mix. I would tell you it is about 12, 12 and a half ships a year.

Mr. TAYLOR. Okay. Given that the shipbuilding account has been frozen at roughly $13 billion a year by the President's request, and Congress has tweaked that a little bit each year and made it a little bit bigger, but it is still not much more than $13 billion, given the cost of this ship at $3.2 billion per copy, best case scenario, how many ships does that let you build a year?

Admiral MCCULLOUGH. I believe it was 7 in the fiscal year 2009 program, and we are looking at 10 in the fiscal year 2010 program that is under debate, or under submittal to the Office of the Secretary of Defense.

Mr. TAYLOR. But this year's budget request was for seven?

Admiral MCCULLOUGH. Yes.

Mr. TAYLOR. Based on the reality of these numbers.

Admiral MCCULLOUGH. Yes, sir.

Mr. TAYLOR. The committee tweaked that up to I believe 10 by moving—by canceling the third—I am sorry, by pausing the third DD 1000, put in an LPD and additional T–AKEs into the mix. The committee was able to take the President's request and get it up to 10, but still dealing with the harsh realities of a $13 billion building account. Is that correct?

Admiral MCCULLOUGH. I have seen the marks, sir, I will defer to you on the marks.

Mr. TAYLOR. The point, I would remind the committee, is that this committee, I think very wisely, is spending $18 billion on mine resistant ambush protected vehicles (MRAPs) so that the kids who are on patrols in Iraq and over the next years are going to be less likely to die from improvised explosive devices. We have a huge bill coming on aerial tankers. That alone is going to be between $35 billion and $40 billion to build the first 179. The National Guard is at about 60 percent of its equipment, and we do not operate in a vacuum. All of these things have to happen.

Again, I personally want to commend Admiral Roughead. He was good enough to sometime last fall throw this proposal at me. It took me some time to think it through, and it obviously would make a change at both the Mississippi shipyard and the Bath shipyard. But given the harsh economic realities, I think he made the right decision, and I think he should be commended for that decision.

Admiral, I want to thank you for appearing, and, Ms. Stiller, I want to thank you for being here.

Mr. Kennedy has a follow-up.

Mr. KENNEDY. When you give your analysis, can you give us ships at sea days, because when we talk about ships at sea that are available, we are interested in the days that they can be at sea. New technology in *Zumwalt* gives us a lot more days at sea, from what I understand, because of its commercial off-the-shelf and the embedded technology makes it so it doesn't, like the old *Arleigh Burkes*, have to come in and spend a lot of time being re-upped and reworked, and spend less lifetime in the shipyard, so to speak. So it is more useful to the Navy more often.

What we are talking about is total number of days that it can actually be used by the Navy. So we want real apples-to-apples comparison.

Admiral MCCULLOUGH. Yes, sir. We can give you the current surface combatants and the projected operational availability of DDG 1000. We can provide that.

[The information referred to can be found in the Appendix beginning on page 132.]

Mr. TAYLOR. Last, I want to remind this committee that it was the will of this committee and the full House and the full Senate that the next generation of surface combatant will be nuclear-powered. Mr. Bartlett began pushing that idea when he was the chairman of this committee, and fuel at that time was about $70 a barrel. And last time I checked, it was over $130 a barrel, making Mr. Bartlett's judgment at that time look even smarter now.

Again, I commend the CNO because I think the extension of the 51 program gets us to a nuclear cruiser quicker than the building of the 1000. So for a lot of reasons, Admiral, I hope you would pass on my compliments to Admiral Roughead. I think he made a tough but right decision for the future of the Navy. Thank you for appearing.

Mr. TAYLOR. The Chair now calls our second panel.

Our second panel consists of witnesses well known to this committee: Mr. Ronald O'Rourke, a Senior Analyst of Naval Affairs with the Congressional Research Service; Dr. Eric Labs, who conducts independent ship cost analysis with the Congressional Budget Office (CBO); and Mr. Paul Francis, the head of the Maritime Analysis Branch of the Government Accountability Office.

We thank all three of you gentlemen for being here. By prior agreement of the committee, you will be recognized for seven minutes apiece. Who wishes to go first?

Mr. O'Rourke, if you don't mind.

STATEMENT OF RONALD O'ROURKE, SPECIALIST IN NAVAL AFFAIRS, CONGRESSIONAL RESEARCH SERVICE

Mr. O'ROURKE. Chairman Taylor, Ranking Member Bartlett, distinguished members of the subcommittee, thank you for the opportunity to testify on this issue. With your permission, I would like to submit my statement for the record and summarize it briefly.

Mr. TAYLOR. Without objection, so ordered.

Mr. O'ROURKE. I would like to make five basic points. First, the recent change in what the Navy wants to do with destroyer procurement appears rooted not just in a concern about shipbuilding affordability, as the Navy witnesses have stated, it also reflects a shift in thinking concerning relative mission priorities. The Navy now wants its destroyer procurement over the next several years to be oriented toward improving the fleet's capabilities for, among other things, air and missile defense.

This shift in mission priorities for new destroyers might be rooted partly in a several-year slip in the schedule for procuring the lead CG(X). The Navy had wanted to begin improving the fleet's air and missile defense capabilities through a procurement of CG(X)s starting in fiscal year 2011, but the date for procuring the lead CG(X) now appears to have slipped several years.

The shift in the Navy's relative mission priorities for new destroyers also reflects a Navy reassessment of the capabilities that will be needed in coming years to conduct certain operations.

The DDG 1000 is a multi-mission destroyer with an emphasis on land attack and operating in littoral waters. This mission emphasis traces back to the program's origins in the early 1990's, and predates certain more recent developments such as, for example, the concern that has developed in recent years over Chinese modernization, an effort that appears aimed in part at improving Chinese capabilities for operating in blue waters, and includes, among other things, the acquisition of more modern submarines, antiship cruise missiles and theater ballistic missiles, including, as DOD has now noted, antiship ballistic missiles.

The DDG 51 is a multi-nmission destroyer with an emphasis on blue-water operations, including air defense and a recently added capability for missile defense. So my first basic point is that this change in the Navy's mission priorities for new destroyers is a key factor in understanding and evaluating the Navy's change in its preferred path for destroyer procurement.

My second point is that although the discussion of restarting DDG 51 procurement has focused on building repeat copies of the current flight to a design, there is also the option of procuring a modified version of the DDG 51 that would have reduced operating and support (O&S) costs. My statement discusses three potential ways for reducing the O&S costs of the DDG 51, and shows some estimates of the O&S savings that might result from such steps. The key point here is that the DDG 51's O&S cost is not written in stone. It can be reduced.

The DDG 51 design can also be modified to improve its air and missile defense capabilities, and my statement outlines some options for doing this, by equipping the ship with an improved radar or additional missile launch tubes, or both.

My third point is that although the discussion has focused on building new DDG 51s, this situation raises the question of whether the current program for modernizing the existing DDG 51s should be altered so that the modernized ships would have reduced O&S costs and perhaps also improved air and missile defense capabilities.

Expanding the scope of work to be done in the DDG 51 modernization program could have implications for the industrial base part of this situation, which I will get to in a moment.

My fourth point is that an additional option for improving the fleet's air and missile defense capabilities through ship procurement over the next few years would be to procure a few or several noncombat ships equipped with a powerful radar for supporting the fleet's missile defense operations and perhaps also air defense operations. The aim in procuring these adjunct ships would be to provide the fleet in the nearer term with some powerful missile defense radars at relatively low cost, pending the entry into service later on of significant numbers of CG(X)s. These noncombat radar ships could be similar to the *Cobra Judy* replacement ship.

My fifth and final point concerns the shipbuilding industrial base. Policymakers have expressed concern about the potential impact on the shipyards of a decision to stop DDG 1000 procurement

and restart DDG 51 procurement. Particular concern has been expressed about Bath Iron Works since construction of surface combatants is Bath's primary source of work. As I discussed in my statement, a notional calculation suggests that building 9 or 10 DDG 51s might provide roughly the same number of shipyard labor hours as building the final DDG 1000s, and that assigning 5 or 6 of those DDG 51s to a shipyard might provide that shipyard with roughly the same number of labor hours as it would have received if it were the primary yard for building 3 of the final 5 DDG 1000s.

But there is more to the issue than that. In discussing the issue regarding Bath and Ingalls, a key point is that building DDG 1000s or DDG 51s are not the only options for supporting these yards. To the contrary, there are several additional options that might be used as supplements to help maintain employment levels and preserve key shipbuilding skills.

My statement lists a number of these options, and it is not an exhaustive list. One of those options would be to assign the modernization of existing DDG 51s to the two yards that originally built the ships, meaning Bath and Ingalls. I maintain a report on the age of ship modernization program, and as I discuss in that report, some industry sources have advocated shifting the DDG 51 modernizations to Bath and Ingalls. And if the scope of work in the DDG 51 modernization program were increased to include steps like those I mentioned earlier for further reducing the ship's O&S costs or for improving their air and missile defense capabilities, then that could increase the amount of supplementary work that would be provided to Bath and Ingalls by assigning the modernization to those two yards.

As I just mentioned, that is only one option for putting additional work into Bath or Ingalls. There are several others. The key point is that building DDG 1000s or building DDG 51s are not the only way to support the yards.

Mr. Chairman, this concludes my statement. Thank you again for an opportunity to provide my statement. I will be happy to answer any questions the subcommittee has.

Mr. TAYLOR. Thank you, Mr. O'Rourke.

[The prepared statement of Mr. O'Rourke can be found in the Appendix on page 75.]

Mr. TAYLOR. Dr. Labs.

STATEMENT OF DR. ERIC J. LABS, SENIOR ANALYST, CONGRESSIONAL BUDGET OFFICE

Dr. LABS. Mr. Chairman, Congressman Bartlett, and members of the subcommittee, I appreciate the opportunity to appear before you today. I would like to make several points, but I, too, would like to summarize my statement for the record and submit the formal one.

First, the total cost of the Navy's shipbuilding program through the period covered by the DOD Fiscal Year Development Plan (FYDP) would be about 30 percent higher than the Navy currently estimates.

Building the newest generation of destroyers and cruisers probably would cost significantly more than the Navy estimates.

My third point, building two DDG 51 *Arleigh Burke* class destroyers per year between 2010 and 2013 would cost less than building five more DDG 1000s. Counting projected operating costs over 35 years, the total ownership cost of five DDG 1000s would almost equal of that of eight DDG 51s.

According to the budgetary information provided in the DOD's 2009 FYDP, the Navy estimates that the cost of all its shipbuilding activities would average about $16 billion a year in 2009 dollars over the period covered by 2009 to 2013. That amount is 25 percent greater than the $13 billion that Navy spent on average for shipbuilding between 2003 and 2008.

CBO's estimates of the costs of those same activities would be about $21 billion through 2013, or 30 percent more than the cost projected in the Navy's plan, and about 60 percent more than the amount the Navy has spent recently.

To the DDG 51 destroyer, the Navy had planned to buy one DDG 1000 destroyer each year between 2009 and 2013. In addition to the two authorized in 2007, the service's 2009 budget suggests that the Navy expected the two ships to cost $3.2 billion each, with the average cost of the five follow-ons $2.3 billion each. CBO, by contrast, estimates the first two to be about $5 billion each, with the average cost of the follow-ons to be $3.6 billion each. And we used the DDG 51 program as an analogy for estimating those costs.

The Navy has asserted that the basis for CBO's estimate may not be valid because the DDG 51 had a number of problems in the early stages of its construction that should not be expected to occur during the construction of the first DDG 1000s. Specifically, the design of the lead DDG 51 was disrupted and delayed because a new design tool being used at the time was incomplete and not well understood. It had to be abandoned and the design restarted using more traditional methods. The design of the lead DDG 51 was thus about 20 percent complete when construction began.

By contrast, according to the Navy, the design of the DDG 1000 progressed far more smoothly. The Navy expects to have the design 80 to 85 percent complete when construction begins this summer.

In addition, because the DDG 51 is a smaller, more compact ship, the Navy believes that on a ton-per-ton basis it has been more difficult to build than the DDG 1000 class is expected to be.

Although the Navy may not encounter the same problems constructing the lead DDG 1000 it did when constructing the lead DDG 51, CBO expects that the service will encounter other problems that will increase the cost. Problems with the first littoral battle combat ships and with the lead LPD–17 illustrate the difficulties the Navy has had. Both the LCS and LPD–17 are much less complex technology than the DDG 1000. And, in addition, while the designs of littoral combat ships and the DDG 51 were only 20 to 30 percent complete at the start of fabrication, the design of the LPD–17 was about 80 percent complete at the start of fabrication, and it was arguably the Navy's most troubled program over the last 20 years.

A comparison of the Navy's estimate for two additional DDG 51s and an assessment for the seven DDG 1000s which were slated to be purchased in 2013 illustrates the risk for cost growth. This information was provided to the Senate. The Navy stated that if the

Congress authorized the purchase of two new DDG 51s in 2009, the cost would be about $3.3 billion, or slightly less than $1.7 billion each.

The Navy has also stated that to build the cost of the seventh DDG 1000 in 2013 would be about $2.4 billion in 2013 dollars. If you adjust those dollars down to the same-year dollars, 2009 dollars, the Navy's estimates imply that the 5,000 extra tons that the DDG 1000 is larger than the DDG 51 will increase that ship's cost by only $200 million, or 10 percent, compared to a DDG 51.

If CBO's estimates prove correct, the lead ships of the DDG 1000 program would actually experience lower cost growth than many of the Navy's lead ship programs of the past 20 years. The Cost Analysis Improvement Group (CAIG) has done an analysis that has shown that 5 of 8 lead ship programs experienced cost growths of over 50 percent. And the CAIG's analysis did not include the *Virginia* class program, which experienced cost growth of 11 and 25 percent for the first two ships. Nor did it include the LCS, which has experienced cost growth well over 100 percent.

Looking at the cost of restarting the DDG 51 program, the subcommittee specifically asked CBO to examine those costs of canceling the program and restarting DDG 51 production. The Congress authorized funding for what would be the last DDG 51s in 2005. Out of a total program of 62 DDG 51s, 9 remain under construction.

CBO does not have sufficient information available to determine how much it would cost to restart the production above extrapolating the cost of the ships themselves. CBO assumed it would cost $400 million to reestablish the lines, and thus buying eight DDG 51s, two per year between 2010 and 2013, would cost a total of $15.7 billion. Building five DDG 1000s between 2009 and 2013 would cost $18.5 billion. Twelve DDG 51s, or three per year between 2010 and 2013, would cost about $21.4 billion.

With respect to total ownership costs of the DDG 1000 and DDG 51 destroyers, the Navy has stated that total operating cost of a DDG 51 would be about $41 million per year, or about 10 percent more than the DDG 1000 $37 million annual operating cost. That difference is much smaller than the Navy previously estimated. In 2005, the Navy asserted that operating a DDG 51 would cost about 30 percent more than operating a DDG 1000. In comparison, CBO at that time testified before this subcommittee and said that the cost difference would actually be about 6 percent more for a DDG 51 versus a DDG 1000.

CBO expects that the total ownership cost of a DDG 51 would be about 60 percent the cost of a DDG 1000. Over the course of a 35-year service life, the cost to buy and operate a DDG 51 would be $2.4 billion. In comparison, the total cost to build and operate a DDG 1000 destroyer would be $3.9 billion. Thus, the cost to buy and operate five DDG 1000s would total $19.4 billion over 35 years. In comparison, the cost to buy and operate more DDG 51 destroyers over a period of 35 years would be about $19.2 billion for 8 ships and $26.8 billion for 12.

Thank you, Mr. Chairman. That concludes my statement. I am happy to answer any questions you may have.

[The prepared statement of Mr. Labs can be found in the Appendix on page 93.]

Mr. TAYLOR. Dr. Labs, for the record, what was the cost of a barrel of fuel when the CBO ran these calculations?

Dr. LABS. You are talking about the total ownership costs. I didn't compare the cost of fuel, Mr. Chairman. I used the statement of operating costs that the Navy used in its letter to the Senate. So whatever the cost of fuel was when they projected those costs.

Mr. TAYLOR. For the record, I would like that comparison, because it is my understanding that the DDG 51 uses less fuel. With the significant growth of the cost of fuel, and without a lot of confidence that that price is going down, I think it is a fair question to ask and something that we need to look at.

[The information referred to can be found in the Appendix beginning on page 132.]

Mr. KENNEDY. Mr. Chairman, I didn't understand what he was saying in terms the operating in a lifetime costs, you know, it is half the number of people on the DDG 1000 as the DDG 51. What was the relative cost of manning the DDG 1000?

Dr. LABS. DDG 1000 is 148 crewmembers, and the DDG 51 is about 320 or 312.

Mr. KENNEDY. So over 35 years, what is the difference in operation?

Mr. TAYLOR. Mr. Kennedy, you will be recognized in regular order.

Mr. KENNEDY. He just testified, and it was very unclear what he was saying.

Mr. O'ROURKE. On the question of fuel costs, I actually put that question to the Navy. They provided that answer to me a few days ago, and they said that the steaming cost figures that show in Admiral Roughead's May 7 letter to the Senate reflected an analysis done in February and reflected a fuel cost of about $112 per barrel.

Mr. TAYLOR. Thank you.

The Chair now recognizes Mr. Francis.

STATEMENT OF PAUL L. FRANCIS, DIRECTOR, ACQUISITION AND SOURCING MANAGEMENT, U.S. GOVERNMENT ACCOUNTABILITY OFFICE

Mr. FRANCIS. I appreciate being invited here today to participate in the discussion of surface combatants. I ask that my written statement be submitted for the record.

Much of what I am going to talk about today comes from a report that we issued today on the DDG 1000. At GAO, we have not analyzed the comparison between continued construction of the DDG 51 and the DDG 1000; however, much of what I am going to say today is going to address the likelihood, and rather, I would say, the unlikelihood that the Navy would have been able to execute the DDG 1000 program within its current budget in terms of time and money.

Let me start off by saying that I think the Navy has done some really good things to manage the DDG 1000 program. I think their approach to technology development has been sound. I think their software-development program has had a very good approach. And

I believe their design process which they modeled after the *Virginia* class submarine has been much better than prior classes.

But even with these best efforts as the Navy stands to begin construction of the first DDG 1000, the cost and the design and the construction schedule are under strain, and let me give you some detail on that.

In the recent schedule for the program, they have extended the delivery of the ship by about one year, which I think is a good thing, but within that schedule, some key events have been pushed out two to three years. The net effect has been a lot of the margin in the construction schedule to adjust for likely problems has already been taken out.

For example, light off of the ship is a key event, and that is when you turn on all of your key ship systems, hull, mechanical and electrical, and all of your mission systems, combat systems like your radars and gun systems and sonar.

Originally on the DDG 1000, they were all going to be lit off in 2011. Now that has been split in two. Now the ship will be lit off in 2011, but the combat systems will be lit off in 2013, two years later. The significance of that is it is just before sea trials begin, so the margin between turning on the combat systems and beginning sea trials has been compressed.

The integrated power system that provides the electricity and the propulsion for the ship, originally the plan was to test that on land in 2008, install it on the ship in 2009, and then have that ready two years in advance of lighting the ship off. The current plan now is to install on the ship in 2009, but not complete the testing until 2011. So the test of the integrated power system will follow installation by two years so that problems discovered will be have to be retrofitted onto the ship. And again, when they have those test results, it will be just when they are ready to light off.

Dual-band radar. The original plan on that was to have both a multifunction radar and the volume search radar tested and installed on the deckhouse before the deckhouse was shipped from Gulfport to either one of the yards. Now the current plan is only to put the multifunction radar in the deckhouse first. The volume search radar has slipped from 2010 to 2013. They won't put the volume search radar on the ship until it is already afloat. And again, that will be just before light off.

Finally, software has also slipped three years. So originally we were going to have the software in 2010. Now it will be 2013. Again, the significance of that is the software, the volume search radar and the light off are all going to occur in 2013, so there really is no margin for error in the schedule.

I look at these as practical, sensible decisions the program office has to make because the combat systems have been delayed. They are not going to be there. But I think the question for oversight is just before we have begun construction, it seems like we have executed all of the workarounds that you would normally execute during construction. So the question is where does that leave us when we do run into problems in construction, and I think they will result in needing more time and money.

In the area of money, the ship construction budget is $6.3 billion for both ships. I think that is unlikely to be enough to pay for the

ships. Right now our historical analysis of lead ships is that they overrun by about 27 percent. Most of that cost growth occurs in the second half of construction. Even the Pentagon's independent cost estimates say those two ships are going to cost almost $900 million more than the Navy estimates.

Being a little more specific, the Navy has about $363 million left in unobligated money. That is money that is not under contract; yet a couple of big things are not under contract yet, including the volume search radar and some of the combat systems. The cost estimates for those are ranging between $340 million and $852 million, so the Navy has just enough money now to cover the low end of those systems not under contract, assuming no cost growth.

That is part of the reason why we question whether it was prudent to go forward with contracting for the third ship in January 2009. Our sense was there would not be enough construction experience to validate the cost estimates and get a good track record on the first two ships before getting a good contract for the third ship, and, of course, setting the prices for the remaining four. Besides that, the Navy was not going to be able to begin construction of the third ship until July 2010 under the best of circumstances, so that ship could be deferred, in our view, without a major impact on the industrial base.

Let me just wrap up by making a few comments on the Navy's proposed decision to truncate the program. In my view, it seems like it is a painful decision, one that is borne out of maybe fiscal and changing requirements necessity. But the decision is a poor reflection, I think, on the requirements, acquisition, and budgeting processes that developed the business cases for these ships.

I don't think it is a case of poor execution that the program office couldn't execute the program well, but rather a business case that wasn't executable. And it is not isolated. It is the last in a series of business cases that we couldn't execute for the time and money set aside. So I think we really have to ask ourselves why is this? Why do ship systems get approved and presented for budget that can't be executed for the amounts that are estimated? And I think one of the reasons is too many demands are made on the ship programs.

I think that what ends up happening is we get unrealistic compromises to try to meet everyone's demands. I will say on the DDG 1000, sort of a microexample where the scope of the ship was set around mission requirements. Then the desire to reduce manning increased the complexity of the ship further. But the budget for the ship—the cost estimate was constrained by the budget, and the schedule was constrained by the shipyard's workloads. So you ended up with something that you couldn't execute.

So just in closing, I was very much struck by Admiral McCullough's comment that current fire support capabilities were sufficient to meet the need, yet three years ago that didn't appear to be the case, and that was the basis for the ship. So we have to ask those questions. What is it about these processes that aren't giving us the right answers at the right time?

Thank you, Mr. Chairman.

Mr. TAYLOR. Thank you.

[The prepared statement of Mr. Francis can be found in the Appendix on page 107.]

Mr. TAYLOR. And I am going to open this up to the panel. In the summer of 2006, then-Chairman Bartlett took us to visit several of the shipyards, including the Marinette shipyard. In the summer of 2006, we were told at Marinette everything is on track, everything is on budget, and sometime between that visit, which I am going to guess was in August, and about November we started getting frantic phone calls from the CNO that we have a world of troubles. We are way over budget, we are way behind schedule. It was several things.

So my question is given what has happened with what was supposed to be a fairly simple, low-cost warship, is there a professional guidepost based on a percentage of the completion of the hull where people can look at a ship and say, okay, we are past, let us say, the 80 percent mark, we are still on budget, and we have reason to believe that everything is tracking the way it should?

The reason I ask that is at what point do we pass that mark on the DDG 1000 so that we have some degree of certainty that the $3.2 billion number that Ms. Stiller just gave us will be accurate and that we are more or less out of the woods?

And so if that is a fair analogy, that is what I am looking for, because based on the LCS, I have a very low degree of confidence that that $3.2 billion target will be met. I open that question up to the panel.

Mr. FRANCIS. Mr. Chairman, let me start off. We have found it very difficult, quite honestly, to find those right way points because it seems like every program has a different set of points and uses a different set of terminology to describe the design process. But nonetheless, on something like the LCS, I would say the percentage of the design, the detailed design, that was demonstrably done as one of those way points, and on that one you would say not a lot of technical content, so you wouldn't have to worry so much about technology development. So I would take that design process and then couple it with what the yard's experience has been in its construction time lines, and you would have to match those then to the cost estimate. I think you can see that up front.

So those are three things that I would list out for something like LCS.

DDG 1000 adds the dimension of technology uncertainty. So even though, let us say, your marker for detail design looks really good, if your radar and your propulsion system and other things haven't been developed and proven yet, those drawings aren't any good. So what looks good at this point might get undone by discoveries with technology.

If they had demonstrated those technologies as they planned, at this point the confidence level would be very high, assuming that they funded at a high confidence level in the cost estimate. And at one point on the ship, they planned to demonstrate the power system and the radar on a surrogate ship that would have given us that confidence. So DDG 1000 is going to be several years, especially until that radar is demonstrated, that we will have that confidence.

Mr. TAYLOR. Anyone else?

Mr. O'ROURKE. Just to add on a slightly different aspect of this, I think another issue to be aware of is whether any of the costs normally associated with building the DDG 1000 will be deferred beyond the normal accounting period for totaling up the ship's total procurement cost. We saw a little bit of that happen with the lead LPD–17, and as I was able to understand it, something like a little more than $100 million of what normally would have been included in the end cost of that ship was deferred beyond the accounting period and was covered elsewhere in the Navy's budget, which gave us a distorted understanding, if you will, of what the total cost was to build that ship. And I think that could be an issue to look at in connection with the DDG 1000 construction process, to make sure that elements that are normally costed within the total end cost of the ship are, in fact, being included there, or whether there are any elements that are being deferred into other accounts and other stages of the accounting process.

Mr. TAYLOR. Thank you.

Mr. Labs.

Dr. LABS. Mr. Chairman, I would add two things to that. I don't have a scientifically based number. I agree with Mr. Francis, it does vary from program to program. I sort of follow a rule of thumb, which is based on instinct and a hunch than anything else, which is that you want to at least see half, you know, 60 percent or so of the ship before you are getting a sense whether things are on cost and on target at that time. You know, your confidence is certainly growing by that point.

Another point I would make relevant to the LCS program is one of the big issues there, in my opinion, was that I don't believe the Navy ever came in with a realistic approach to the cost of that ship to start with. Any historical analogy to save the frigate program, the FFG–7, would have told you that a ship of that size would cost somewhere in the $400 million to $500 million range. If they had started with that premise and worked from there, I honestly don't believe the LCS would have been in as much trouble as it has been over the last couple of years.

Mr. TAYLOR. Gentlemen, we have six people, five-minute rule. We are supposed to have a hard stop at 1 p.m. I hope the committee will let us go five minutes over. So we are going to strictly adhere to the five-minute rule starting with Mr. Bartlett.

Mr. BARTLETT. Thank you.

One of you mentioned that the Navy now says that they have adequate fire support. I know that through the years there has been a considerable difference of opinion between the Marine Corps, whom they are supporting, and the Navy as to what adequate fire support is. Are they now in agreement?

Mr. FRANCIS. That is what I understand from the Navy. We did a report for this committee, this subcommittee on that issue two years ago, and they had finally reached agreement, and the agreement was there was a gap that needed to be filled, and it needed to be filled by the DDG 1000. So to hear today that the agreement is that, in essence, gap is not there and doesn't need to be filled by the DDG 1000 would represent, in my view, a new agreement.

Mr. BARTLETT. Thank you.

When we first envisioned the DD(X) program, how many ships were envisioned?

Mr. O'ROURKE. In the early stages when it was still DDG 21, a number as high as 32 was mentioned. And that then became 16 to 24, and that got moved down to 12, and then it became 8 and then became 7.

Mr. BARTLETT. As I watched this occur, I was impressed that what we ended up with was—even at seven ships, it was not a class of ships, it was little more than a technology demonstration platform, and I thought that two was a little different number than seven, if, in fact, it was simply a technology demonstrate platform.

I signed onto this program when I was assured that the hull was going to be used in CG(X). I feel a little had now when I am told the hull will probably not be used in CG(X), because my original disposition was that if all it was was a technology demonstration program, maybe we could demonstrate those technologies on other platforms and save the cost of this class and begin earlier or enlarge the second class.

Mr. O'Rourke, I was interested in your little charts that showed the comparison between the cost of the DDG 1000 and the DDG 51. Of course, where the DDG 51 fell far short was in manning. How much of a modernization that we might use could really reduce manpower costs to near that of the DDG 1000?

Mr. O'ROURKE. I put that question to the Navy because Admiral Roughead's May 7 letter to the Senate referred to the fact that his chart did not include any manpower reductions that would be realized through the DDG 51 modernization program. And the Navy came back to me when I asked them about that, and the understanding that I have based on the Navy's explanation back to me is that the DDG 51 modernization program is not officially expected to achieve any further manpower reductions, but that the size of the DDG 51 crew for other reasons has recently been reduced by about 18 people from the figures shown in Admiral Roughead's letter.

So the size of the DDG 51 crew, as explained to me by the Navy, is coming down by about 18, but not because of the DDG 51 modernization program. And my own statement talks about the possibility of taking the crew size down further on the basis of an industry briefing that was given to me five years ago, and also this subcommittee's own statement along those lines and a committee report that came out in 2004.

Mr. BARTLETT. As the price of oil goes up, the Chinese are increasing their efforts at scouring the world to buy oil, and not just oil, but buy goodwill. Coincident with that they are aggressively building a blue-water navy. None of this, of course, was accurately predicted in 1995 when we began the design of the DDG 1000 line.

In view of the fact of what China is doing, and we now have the LCS, which was not even a dream in 1995, is this not a good decision to go to the DDG 51, which has more of a blue-water focus, than staying with the DDG 1000, which had a considerable littoral focus?

Mr. O'ROURKE. As a CRS analyst, I can't say whether a decision that someone advocates is good or bad, but what I can tell you is that there have been certain developments in the Navy's under-

standing and the general understanding of what the future operating environment might be that have occurred since the early 1990's, which was the period when the DDG 21 program was originally conceived. And one of those major developments was the growing concern over Chinese naval modernization, which is something that I track in some detail in another one of my CRS reports.

Concerns over Chinese naval modernization did not begin to mount in general discussion until the mid- to, I would say, in the late 1990's, and the discussion has really only gotten going on that, I would say, in the last five years or so. So this, to me, is a much more recent development compared to the date and time when the DDG 21 program was conceived.

Mr. TAYLOR. The Chair now recognizes Admiral Sestak from Pennsylvania.

Mr. SESTAK. If I can make a statement, I actually find today a bit disappointing to some degree to what you spoke about, Mr. Francis.

From what I can gather over the past months, there has been a decision that the Intelligence Community has said something has moved to the left, that we now need a ballistic missile defense ship at sea to face a more nearer-term threat than we had had from the Intelligence Community for quite a few years.

I have never met a one-armed intelligence officer because they are always saying on the one hand, but on the other hand. However, we are making a dramatic sea change right now, a strategic sea change for a ship based upon some intelligence, is what I gather from today's testimony.

Undergirding that is a concern about numbers of ships to where I had thought, particularly under CNO Clark's tenure when he proffered that maybe 260 to 300 ships in his 30-year shipbuilding plan was a way to begin to come to grips as a Navy that potentially posturing differently, let us say more ships of BMD stationed in Guam, for whatever reason that that might be an area of the world where you would want that capability rather than having to rotate them, taking five to keep one forward, could begin to give us a Navy that isn't always turning it appears that we need more money. In fact, the 30-year shipbuilding plan this year says we need 40 percent more to do our 30-year shipbuilding plan for 313 ships than just last year, and then the cost that comes with that.

So my issue today is more of credibility not of individuals, but of a process of how can Congress truly have credibility on two areas. One obviously, I think, is the cost. Do we really know what this DDG Flight II will be? In your testimony it is a standard stick-shift Flight II, but my limited knowledge of what that radar is going to have to do if this threat has truly moved to the left is that radar will need a lot of upgrade to handle this threat. Where is that cost?

Second, I don't know where the strategic sense of the Navy is today. We were going to the littorals. Just like Secretary Gates in the front page of the Post said today for our military, it is the global war. Now we have gone back to the blue seas, and I gather there is a spectrum here.

I was taken by the analysis over the years in the Navy that drove us to a certain position. I am unimpressed by the failure to

provide that same kind of analysis that Congress, I think, should be making its decision on, not how many ships, but what is the capability we need. And so I guess mine is more a statement of disappointment in credibility of a process, not only how we got here, but how do we prevent it in the future, the most capable Navy at the least cost. And this is a strategic sea change. And, frankly, from my limited time in the Navy, I don't feel I have the factors in front of me to make a decision, nor have I been able to gain them. This may be the right decision.

Just for a question, what do you feel about the credibility of the process that got us here? And, Mr. O'Rourke, the credibility of the strategic sense of where the Navy is going, the Navy of the future, because we are making a dramatic change in integrated air and missile defense (IAMD).

Mr. FRANCIS. Quickly, Mr. Sestak, I do think that we need to ask some fundamental questions about requirements, acquisition and budgeting. The discussion today, I think, was unique in that we are talking about a change in requirements. Part of my analysis is even had those requirements changed, we would not have been able to execute the programs as planned. So maybe that deals more with acquisition and funding. But when you add the requirements piece, for ballistic missile defense, that is a portfolio system, so we have to ask a hard question that if there is a change in that threat, how does that translate into an Aegis capability? And, secondarily, what did happen with the fire support requirement for the marines?

Mr. TAYLOR. The Chair recognizes the gentleman from Virginia Mr. Wittman.

Mr. WITTMAN. Thank you, Mr. Chairman.

Mr. Francis, you spoke earlier about the development of these major systems on board and, because of the delay in the development of those, those systems not being lit up until just about the time the ship goes to sea trial. Can you explain some of the extended concerns about that and how that may either affect cost or affect delivery times on potentially DDG 1000s, and how that maybe plays into the decisionmaking on DDG 51 in the context of what the Navy is presented?

Mr. FRANCIS. Yes, sir.

Our analysis shows that under the current schedule which has just been readjusted as construction begins, that those key events, like the integrated power system, the combat systems, particularly the radar and the software, are all planned to occur, demonstrate late in the program. If there is any delay in those systems, light off will get pushed out, which means the sea trials will get pushed out, which means IOC, the initial operational capability, will get pushed out.

As the schedule delays, you incur additional costs, the overhead of the yards, software engineers and so forth. So the implication of that is if anything goes wrong, if any of those things don't deliver as planned, and deliveries have been changed a number of times, we will have cost increases, which means then that the money we have set aside to buy at this point the seven DDG 1000s won't be enough, and we will most likely end up making adjustments in the

near-term budget to accommodate those increases, which will push other ships out. So I think that is the tie between the two.

Mr. WITTMAN. One additional question. You had spoken that the yards couldn't start on DDG 1002, which is the third ship requested in the fiscal year 2009 budget, until July of 2010 at the earliest. Do you have any sense when either yard could start construction of a DDG 51 considering the time frame they spoke about being able to start on DDG 1002?

Mr. FRANCIS. That I don't, sir. I know there was a discussion about the reduction gear time line perhaps being the pacing item, and I thought that was set at 50 weeks. I don't know if my colleagues have any information on that.

Mr. O'ROURKE. The amount of additional long lead time for the reduction gear is an additional—the time period is the addition on top of what the normal lead time would be for the reduction gear. The reduction gear is one longer pole in the tent, and the other variable in that situation is the extent to which—and I think Allison mentioned this—the extent to which you can look at doing the construction of the ship through an altered sequence that would accommodate a later delivery of the reduction gear than would normally take place in the sequence. So 50 weeks on top of the normal lead time.

Mr. WITTMAN. If 400- to $450 million were appropriated and authorized for advantaged procurement of a destroyer in 2009, what do you estimate the industrial base impacts might be if that decision were made?

Mr. O'ROURKE. I think it would depend on what other near-term work would be put into the yards to make up for whatever gap might be developing between the winding down DDG 1000 work before you begin to wind up DDG 51 work. There will be potentially a valley developing depending on the timing of DDG 51 restart, and then it becomes an issue what other work was put into the yard to fill out that valley.

Mr. WITTMAN. Would those dollars smooth out that dip?

Mr. O'ROURKE. The sooner you commit money to the 51 restart, the greater likelihood you have of mitigating the valley between the winding down of the DDG 1000 work and the winding up of the DDG 51 work.

Mr. TAYLOR. The Chair recognizes Mr. Courtney for five minutes.

Mr. COURTNEY. Thank you, Mr. Chairman.

I would actually like to ask Mr. Labs a couple of questions. Earlier Mr. Taylor was pointing out the track record over the last four or five years of a $13 billion flat line for shipbuilding or average cost for shipbuilding. In your report on page 2, you estimated—well, you reported, rather, that the Navy's shipbuilding plan projects a cost of roughly averaging $16 billion. Your analysis is that it is probably closer to $20 billion; is that correct?

Dr. LABS. That is correct.

Mr. COURTNEY. If we follow this recent or this new recommendation to switch from the DDG 1000 to the DDG 51s, would that change your numbers?

Dr. LABS. Absolutely it would change the numbers. Would they change the numbers significantly? I don't know. I would have to actually sort of run those numbers, do the analysis.

Certainly there is a number of changes that the Navy is also proposing to make, not just the cancellation or the truncation of the DDG 1000. They are also proposing to push the CG(X) beyond 2013. That frees up money within the FYDP. I would need to reanalyze to tell you whether the Navy has gotten closer to a $13 billion steady state, if that is your desired aim, or something else.

The basis of the numbers that I have presented in my testimony assumes two DDG 51s a year, which we assume cost more than the Navy's estimate for DDG 1000, although I don't think that they cost more than the CBO's estimate of the DDG 1000.

On the other hand, the Navy's profile that Admiral McCullough talked about was not two a year; it was one, two, one, two, something like that. So some of those individual unit costs might be higher, but the overall annual budget cost would be lower. I would have to run those to know what the effect is, and whatever other effects the Navy makes in their shipbuilding plan.

Mr. COURTNEY. Is your analysis based on 2008 dollars?

Dr. LABS. 2009 dollars.

Mr. COURTNEY. So if we are looking at the back end of the shipbuilding plan, which is somewhere between 2017 and 2019, and actually I am assuming there will be some inflation between now and then, we are talking numbers that are going to be significantly higher than even what you report?

Dr. LABS. Absolutely. The CBO analysis is in constant 2009 dollars. So if you want to see what those numbers look like in then-year or budget-year dollars, you would have to add inflation on top of that.

Mr. COURTNEY. It is certainly going to give the next Administration a big headache coming in.

The other question, you heard Admiral McCullough testify that this change would move up the schedule to hit the 313 fleet from 2017 to 2019. I just wonder if you had any comment on that projection, whether or not that makes sense to you?

Dr. LABS. Doing sort of a mental calculation, that seems plausible. Last year's schedule on the LCS program had a different building profile, and the 313 ship goal was going to be hit in 2016. Now with this year's shipbuilding plan, that got pushed out by three years. If you end up putting more destroyers in the plan versus what is currently in the budget, it seems plausible you will reach that two years earlier.

Mr. O'ROURKE. I took Admiral McCullough's comments to be based primarily on simply the difference between getting another five DDG 1000s and getting eight or something like that DDG 51s. And you have an extra 3 or something ships, and if you were getting kind of close to 313 anyway, you might get over that number 1 or 2 years higher. That is how I understood the comment from Admiral McCullough.

Mr. FRANCIS. I don't have anything to add on that.

Mr. COURTNEY. I thank you, Mr. Chairman.

Mr. TAYLOR. The Chair thanks the gentleman.

Just for your information, the Chair will recognize in order Mr. Allen, Mr. Langevin, and Mr. Kennedy, and that will conclude the hearing.

Mr. Allen.

Mr. ALLEN. Thank you, Mr. Chairman. And thank you all for being here today.

I would like to begin with a statement. This clearly was a tough decision for the Navy made at the highest levels, but, at least from my perspective, it seems to me the right decision. I do believe the Navy has defended this decision in terms that can be easily understood. You would have to be in this area not paying attention to understand that the threat of quiet submarines is an issue that we need to pay attention to as a country, and that the development and the proliferation of missile technology is something that every branch of the service has to take into account.

If you marry that to their reevaluation of how often they would actually use the land support firepower of a DDG 1000, I believe the Navy has made a case.

But I have real concerns for what the decision means for the industrial base going forward. In some ways going back to an established program means there will be greater stability going forward, but I am concerned about the number of ships.

As I read your testimony, Mr. O'Rourke, it sounds as if you are saying that six DDG 51s would essentially replace the work at Bath Iron Works of three DDG 1000s. I'm not sure that is the right number. I think we need to know more and get some sense of the timing.

I am also concerned if the CG(X) gets pushed out over some period of time, there is another gap developing here. Whether we are looking beyond this period or we are adding some more DDG 51s into the FYDP, it does seem to me that we are going to need more FYDPs to fill this gap, because we have to preserve the six shipyards that we have today. I think they are a vital component of our national security.

Having said all of that, I am interested in your suggestions for other work, because no matter where we go, these shipyards need some additional work, particularly Bath Iron Works, which is dependent on surface combatants, and so I would like to get some sense from you, Mr. O'Rourke, of what can be done to preserve in particular that yard because it is so dependent on surface combatants? What other work could we move their way?

Mr. O'ROURKE. That is one of the larger points that I do try to make in my testimony. When we are looking at the situation facing Bath, it is not one that is solely of DDG 1000s or DDG 51s, because there are a number of other possible forms of work that could be put in these yards, and I listed a number of these options in my testimony.

I have already spoken about the idea of assigning the DDG 51 modernization to the boatyards.

Another one is to assign the Aegis cruiser modernization to the build yards.

A third would be to procure some number of these noncombat adjunct radar ships that I talked about.

Another would be to have Bath Iron Works participate somehow in the construction of the littoral combat ships that are built to the General Dynamics design.

Another is to procure one or more LPD–17s beyond those that are in the Navy's current shipbuilding plans and perhaps have

Bath participate in building parts of those ships, similar to how Bath in fact is participating in the construction of one of those LPDs already.

Another option is to procure additional LHA-type amphibious—big-deck amphibious assault ships.

And then there were some other options I also mentioned. I developed a list of 10, and I don't even think that is exhaustive.

And one other key point is that even if you add something to the shipbuilding plan and it only goes to Ingalls, that could still help Bath because it could permit more of the DDG–51 work to go to Bath, while still adequately supporting Ingalls. So we have to look at the total mix of work between both of these yards and then decide what might be the most cost-effective path forward.

But my main point is that this is not a question of building only 1000s or only 51s. There are a number of other things out there that could put work into these yards to support employment levels and to preserve critical shipbuilding skills, including outfitting skills and combat system integration skills.

Mr. ALLEN. Thank you, Mr. Chairman. I will yield back.

Mr. TAYLOR. Thank you.

The Chair recognizes Mr. Langevin from Rhode Island.

Mr. LANGEVIN. Thank you, Mr. Chairman.

I want to thank the panel for being here; and, Mr. Chairman, again I want to thank you again for holding this very important hearing on a very complex issue.

Let me say that I have not been impressed by the process that the Navy has gone through in making the decision to cancel the DDG–1000 program and going to the 51s, and it seems to me that there is a rush to judgment here without thorough analysis.

To the panel, let me ask you this question. In the Navy's testimony, they estimated that the DDG–51 line could be restarted in fiscal year 2009 even though they are facing several ship and vendor-based issues. My question is, what are your views about the feasibility of restarting the 51 line in fiscal year 2009 and what would you estimate the costs of resuming production to be?

Dr. LABS. I do believe that the Navy can certainly restart the line in 2009. The question comes as to when would the ship deliver. If you have a delay because of the reduction gear or other parts, other reasons, you need to get various vendors up and running again, the ship may not deliver in four or five years, which is what you typically see with DDG–51s today. It may take six years for that ship to deliver. So you can certainly begin building DDG–51s in 2009 if you choose.

If you are trying to ask me what are the exact costs of sort of reestablishing those production lines, as I indicated in my testimony, I don't have a good handle on that, and I am not sure the Navy has a perfectly good handle on that yet. We assumed for the purposes of this analysis that it would cost around $400 million to sort of reestablish that line. The costs could be more or costs could be less. Because there is—the shipyards themselves have to restart production, but there is also a number of Government Furnished Equipment (GFE) components, government-furnished equipment, that also must be provided. And I don't have a complete analysis

of what all the potential costs and implications of that are at this point.

Mr. LANGEVIN. And other panel members disagree or want to add to that?

Mr. O'ROURKE. I just think it also depends in part on what it is we are talking about when we talk about reopening the line. It is not really just one object. It is a lot of vendors and a lot of locations. The Navy can certainly take steps to reopen or reestablish certain elements of that line along certain timelines. So something could be done in fiscal year 2009. Exactly how much and, as Eric said, what effect that ultimately has on when that first ship is delivered is a somewhat different question.

Mr. LANGEVIN. All right. Well, there has been, of course, now in terms of actually restarting the line—and you are not exactly going to be building the old 51s, because we are talking about insertion technologies. So, you know, there has been discussion of incorporating these new technologies and design changes to the DDG–51, which could further increase per unit costs over historical trends. Have you received any information from the Navy as to what additional capabilities the DDG–51 might have and what the cost estimates would be for those changes? And if so, could you comment on the Navy's estimates?

Mr. O'ROURKE. Just very generally, in my own testimony I have included discussion of options for altering the configuration of the Flight IIA design to include additional features, either an improved radar or more missile launch tubes, or both. But my understanding, both prior to this hearing and also listening to the Navy's testimony at this hearing, is that they are proposing not to build altered DDG–51s but more or less repeats of the current Flight IIA design as it would exist in the DDG–12.

Mr. LANGEVIN. Let me stop you there, if I could, because it is my understanding that the existing design of DDG–51 is not capable of supporting the radar that would be needed for ballistic missile defense, which is what their—major part of their rationale of moving back to the 51s, because it——

Mr. O'ROURKE. Right. And the sense I get from the Navy's testimony is that they are not envisioning changing the radar on the ship. That is an option I discussed in my testimony, but I think that the path that the Navy laid out in their testimony is to continue getting the 51s with a SPY–1 radar, not with a radar using active array technology. And so, although I discuss that in my testimony, the sense I get from the Navy's testimony is that they are looking at not doing that, not making any major changes to the combat system of the ship as it would exist from the DDG–112 baseline.

Mr. FRANCIS. Mr. Langevin, there are—I know in the missile defense budget they do put in money to modify the Aegis ships, both the cruisers and the destroyers. So there are some modifications associated with being compatible with the ballistic missile defense ships (BMDS). Now whether it is physically to the radar itself or whether they are software upgrades or what have you, but there would be a cost that would have to be accounted for in the new ships if in fact they are being deployed for ballistic missile defense.

Mr. O'ROURKE. Right. But the ships that the Navy is talking about building, based on their testimony today, is a configuration that is similar to what you get when an existing DDG–51 comes out of the modernization program, which is the configuration similar to DDG–112, the last of the 51s currently under construction. That is not a ship with a different radar, it is not a ship with additional missile tubes or any other major configuration changes.

Mr. TAYLOR. The Chair recognizes the gentleman from Rhode Island, Mr. Kennedy.

Mr. KENNEDY. Thank you. Thank you, Mr. Chairman.

And, Mr. Chairman, I agree with you, frankly, on the whole premise of your hearings, that we haven't gotten the Navy's true answer on really the real cost of these ships. But the same goes true with the flip side of the coin. What makes us think, if we haven't gotten the true cost of the DDG–1000, that we are going to get the true cost of the retrofit of the DDG–51? Okay?

So you are going to say to us, we are going to save a lot of money because we are not going to go down the, quote/unquote, cost overruns of the DDG–1000, and then you are going to give us a lot of reasons why that is so expensive. But then we are going to avoid talking in this hearing about what Mr. Langevin just brought up, and that is all of the costs that have not been brought up that will be incurred from the vendor base that will have to be restarted.

Granted we didn't even appropriate any dollars in this year's appropriations bill for any DDG–51s. So we are talking 2005 was the last time they came off, trying to restart that vendor base. You just pointed out that it is closed architecture. So trying to retrofit and redesign every subsystem of the DDG–51 so that if you are trying to upgrade the radar you have got to do that and if you are trying to upgrade this you have got to do that, and who knows what the real cost of the reduction gear long lead time is? Do you guys have any idea? I mean, I know that you quoted $400 million, but where did that number come from? From CBO? Can you guys provide that?

Dr. LABS. I used the $400 million number as an assumption based on, actually, this subcommittee's mark in the authorization bill, where you appropriated $400 million either for DDG–1000 advanced appropriation or for surface combatant advanced appropriation. As much as we have tried with either the contractors or with the Navy, we haven't gotten any details on that.

Mr. KENNEDY. Okay. Well, obviously, the point being is that we can't put our finger on anything that you are giving us if we are not getting an apples-to-apples comparison, whether it is talking about DDG–51 or 1000. And it is not fair for us to be out there whacking the cost of 1000 for costs if you are not comparing it to what the refit cost of 51 is. That is one issue, and we are just talking costs there.

Now the second issue is what Mr. Sestak brought up; and that is, what is the national security interests here? And it seems as though we have had several CNOs come up to the Congress for years and say that we needed this DDG–1000 because the littoral environment was where our threat was. And what I am interested in is, as Mr. Sestak said—and, by the way, Mr. Sestak was the Deputy Chief of Naval Operations for Warfare Requirements and

Programs when he was in the Navy. So he should have some idea of what this stuff is. And he said it baffled him, just up here right now, what the big change in rationale was. He was there when the intelligence was dictating the littoral environment. He knows—when he said, why not move the ships over to Guam, you know what he was talking about. He was talking about the Taiwan Straits and China. He is talking about the missile defense from China.

The DDG–1000 has the stealth capability. It looks like a fishing vessel out there, according to the testimony. Whereas the *Arleigh Burkes* look like big huge destroyers and can be picked off like that.

When are we going to factor in the cost of 360-some odd American lives on these vessels, too? These are all calculations we are going to make if they are going to be patrolling the waters. When does America not want to be looked at like we are overbearing in those straits and instead have a nice, calm, stealthy cruiser out there for protection, but we don't want to have visible annoyance by having a big, big destroyer out there? But a nice stealthy destroyer like a DDG–1000 is just what we want in case we need it, but not in their face, which is what we want with the Chinese. Not in their face but there in case we need it.

These are major policy decisions on national security basis we need to consider. And, frankly, I don't think we have really gotten it; and so that is what I hope we get a better answer from the Navy on.

I thank the chairman for giving us this time today to have these hearings.

Mr. TAYLOR. Sure.

Mr. O'Rourke.

Mr. O'ROURKE. Yeah, just very briefly, I agree with you that we need to see a comparison of the two paths forward in terms of costs that accounts for whatever configuration changes, among other things, the Navy might want to make in the 51 design. They need to show those numbers.

And I agree with you also that I think the Navy needs to explain more fully the concept that they have introduced here in their testimony today that they have undergone a shift in their thinking about missions. And what I gather from Admiral McCullough's testimony today is that they feel they have done that analysis and that they are prepared to share it. I think they now need to share it so people can see these things and make their evaluation.

Mr. KENNEDY. With your indulgence, Mr. Chairman, one point.

Mr. TAYLOR. Mr. Kennedy, it is not so much my indulgence, but the committee is going to need this room at 2 o'clock, full committee.

Mr. KENNEDY. Okay.

Mr. TAYLOR. But if I may, let me answer a couple of questions that you already asked, and I think you did it—I think you asked some great questions.

Number one, our Nation has already received—delivered over 50 DDG–51s. So I think it is fair to say that we have a very good track record of what they cost and what all the equipment on them cost.

Second thing, I would remind the gentleman that the 1000 is physically one-third larger than the 51. So if it is just looking for something—and I have got to tell Mr. Kennedy that I am absolutely amazed on my flights overseas to visit the troops how many ships you see as you are crossing the ocean. Yes, it is stealthy on radar, but in the case of the Taiwan Straits, as you mention, it is a fairly small place with a lot of junks, a lot of nonhostile vessel traffic and, yes, a lot of airlines up there, any one of which can hit their GPS and go, that is your latitude and longitude of the American fleet. So, again, just something we ought to keep in mind.

I do want to commend all of the witnesses for asking some great questions. That was the purpose of this hearing, to clear the air. And if any of you three gentlemen would like to answer Mr. Kennedy's questions, and then we will let you go.

Mr. FRANCIS. Just two points, Mr. Chairman, Mr. Kennedy.

I take at face value what the Navy said about the change in the blue-water threat and the missile defense. I do think the statement that the fire support requirements can be met with existing capabilities, that came as a surprise to me.

And I think the chairman makes a good point on cost. I think we have to be skeptical of cost estimates, but the DDG–51 has a lot of actual cost history. And I would come back to the chairman's challenge that he mentioned in the beginning of the hearing, ask for a fixed price and see who gives you a fixed price contract, and I think you might get one on the 51. It is a good question to ask, and I think it is telling that you can't get one on the DDG–1000.

Mr. O'ROURKE. Just very quickly, to sum up what I was saying earlier, Admiral McCullough said in his testimony today that they have done the analysis. So I think it is reasonable for other people to ask to see that analysis.

Dr. LABS. Mr. Chairman, Mr. Kennedy, I would just simply agree with Mr. O'Rourke and Mr. Francis. I think you are absolutely right. You are entitled to sort of see what the numbers are going to start those vendor bases back up again. But we do have an awful lot of statistical and historical data on the DDG–51 that makes it at least easier for somebody like CBO to sort of give a better sense of what it might be than, say, the DDG–1000, where you really have to use different kinds of analogies.

Mr. TAYLOR. Again, we want to thank all of our witnesses. We want to thank all the members who participated. And this hearing is adjourned.

[Whereupon, at 1:15 p.m., the subcommittee was adjourned.]

A P P E N D I X

JULY 31, 2008

PREPARED STATEMENTS SUBMITTED FOR THE RECORD

JULY 31, 2008

Opening Statement of Chairman Gene Taylor
Subcommittee on Seapower and Expeditionary Forces
Oversight Hearing On Navy Destroyer Acquisition Programs
July 31, 2008

The Hearing will come to order.

Good morning. This may very well be the most important hearing this subcommittee has held since our hearing last January on the procurement of mine resistant ambush protected vehicles. I thank the Members of the subcommittee for their attendance on this very busy legislative day.

Because this is such an important topic we are discussing today, the Ranking Member and I extended an invitation to other Members who are not members of this subcommittee to attend. In accordance with the Rules of the House, I ask unanimous consent for our colleagues to participate with us today. Hearing no objection, our colleagues will participate in regular order after all Members of the subcommittee have had the opportunity to ask questions of the witnesses. Because of time constraints and the number of Members who wish to ask question, the clerk will maintain the 5 minute clock during the question and answer period.

When the Ranking Member and I first called for this hearing, the purpose was to ensure that all of the facts associated with the capabilities and procurement costs of the DDG 1000 and the capabilities and procurement costs of the DDG 51 were discussed in open session by a variety of expert witnesses. We envisioned a hearing that would clear the air of rumor and lay out all the facts without championing any "side" in the debate.

Much has changed in one month's time. Last week the Secretary of the Navy and the Chief of Naval Operations announced they would stop the DDG 1000 destroyer class at two ships and re-start the procurement of DDG 51 class destroyers. They propose 8 ships in the 5 year plan beginning next year.

Predictably, this announcement from the Navy has generated a firestorm here on capital hill. There are Members who are opposed to the decision and Members who support the decision. There also appears to be significant efforts by certain defense contractors to shore up support for the DDG 1000 and have Congress overturn the Navy decision.

So in point of fact, we still need a hearing to clear the air on mission capabilities and costs of the two destroyer programs. But now I presume our Navy witnesses, particularly VADM McCullough who is the senior officer in the Navy charged with developing future platforms and technologies, will attempt to educate us on the reasons the Chief of Naval Operations has decided that he can best support the interests of national security with continuing the line of DDG 51 class ships than he can with building the small class of highly capable, but very expensive DDG 1000 destroyers.

This subcommittee was, and is, concerned with cost estimates for the DDG 1000. But let me be very clear – this subcommittee DID NOT recommend canceling the DDG 1000 as we have been accused in the press. What this subcommittee recommended, and the full House adopted in May of this year, was a pause to the third DDG 1000 while the development of technologies and true costs of construction became known on the first two ships. This subcommittee also recommended allowing the option of returning to DDG 51 class destroyer procurement if the Navy could prove it was in the best interest of the nation to do so. The report accompanying our bill clearly states that the funding provided in the FY 09 National Defense Authorization Act could be used for either DDG 1000 advance procurement or DDG 51 advance procurement.

I would like to make my position clear: I want the Navy to have the finest, most capable fleet in the world. I want the Navy to have a sufficient number of ships with the capabilities needed to counter next generation threats. I don't think we have enough submarines, and this sub-committee has worked in a bi-partisan manner to allow the Navy to increase the production of submarines, my friends Joe Courtney of Connecticut and Rob Wittman of Virginia were instrumental in that effort. I don't think we have enough amphibious assault ships for our expeditionary forces and with the support of the Ranking Member we have authorized an additional LPD to the Navy fleet. And finally I don't think we have the correct balance in our surface combatant force. I understand the history of the DDG 1000, it grew out of the DD 21 program and became the poster child for "revolutionary change" in ship capabilities in the Rumsfeld era. The question before the Congress is simple: does this ship have the correct capabilities the Navy needs for the future? Does the Navy every envision shore bombardment again? If not, why design a ship which is sized for a gun that won't be used? In this day of precision guided munitions and air dominance the idea of a World War II type of naval bombardment support needs to be debated.

This leads us to the DDG 51, the finest destroyer in the world today. A ship that is capable of multiple missions, from anti-submarine warfare to cruise missile strike warfare to area air defense with its Aegis weapons system it is the premier workhorse of the fleet. And perhaps most important, the ship is capable of serving in a ballistic missile defense role, which the DDG 1000 can not do. Fifty three of these ships are currently in the fleet, 9 more are in various stages of construction.

But if the Navy wants to build more of them, we need more information. Information not just about cost targets for new ships, but information on the total concept of support for the entire fleet of destroyers. The modernization program for destroyers is just as important as the construction program. We can never allow the decommissioning of vessels like we did with the first 5 Aegis cruisers because they could not be modernized to meet the new threat. So I am interested in the DDG 51 modernization program also. I question why the Navy is not modernizing these destroyers at a faster rate, and doing the modernization in the construction shipyards which have the expertise and experience to do the major modifications effectively and efficiently. I would like to know how we can use the technologies developed for the DDG 1000 weapons system and propulsion system and back fit them into the DDG 51's during a modernization period.

So there is lots to discuss, the Navy has a tough road ahead. There are still some pretty large hurdles here in the Congress that they need to jump. Hopefully this hearing will allow the Navy the opportunity to explain their side of the issue.

We have two panels of experts today to walk us thorough all these issues. I have requested that VADM McCullough give the subcommittee a brief tutorial on the capabilities of both vessels at the beginning of his testimony. Members will also find a side-by-side description of the ships in the memorandum prepared by the staff.

We need to get this right. We need to get the Navy on a stable path of building ships and then build them at the time and at the cost that is projected. Our shipyards and the contractors who support them deserve to know what we expect them to do and when we expect them to do it. But more important we need to give our naval commanders the capability they need to defeat our current and potential enemies.

So I believe this debate needs to focus on the capabilities of these ships. I remind my colleagues, and the public, that numbers of ships is in itself a significant capability. The full Congress must weigh the capabilities of the ships, the costs associated with the ships, and the effect on the nation's national security industrial base when making the final decisions to proceed or not proceed with either destroyer program

I am happy to acknowledge our first witnesses today. The Secretary has again sent to us the "A" team. Ms. Allison Stiller is the Deputy Assistant Secretary for Ship Programs in the Office of the Assistant Secretary of the Navy for Research, Development and Acquisition. VADM Barry McCullough is the Deputy Chief of Naval Operations for the Integration of Resources and Capabilities.
Our second panel also consists of witnesses well known to this committee. Mr. Ron O'Rourke is a senior analyst in Naval affairs with the Congressional Research Service, Dr. Eric Labs conducts independent ship cost analysis with the Congressional Budget Office, and Mr. Paul Francis heads the maritime analysis branch at the Government Accountability Office.

I thank all the witness for being with us today and now yield to my friend from Maryland for any comments he may wish to make.

(Mr. Bartlett Comments)

Ms. Stiller, Admiral McCullough, please proceed with your opening statement and the side-by side discussion of the two destroyers.

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THE HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE SEAPOWER AND
EXPEDITIONARY FORCES

STATEMENT

OF

VICE ADMIRAL BARRY MCCULLOUGH
DEPUTY CHIEF OF NAVAL OPERATIONS
FOR INTEGRATION OF CAPABILITIES AND RESOURCES

AND

MS. ALLISON STILLER
DEPUTY ASSISTANT SECRETARY OF THE NAVY
(SHIP PROGRAMS)

BEFORE THE

SUBCOMMITTEE ON SEAPOWER AND EXPEDITIONARY FORCES

OF THE

HOUSE ARMED SERVICES COMMITTEE

ON

SURFACE COMBATANT REQUIREMENTS AND ACQUISITION STRATEGIES

July 31, 2008

NOT FOR PUBLICATION UNTIL RELEASED BY
THE HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE SEAPOWER AND
EXPEDITIONARY FORCES

Chairman Taylor, Ranking Member Bartlett, and distinguished Members of the Seapower and Expeditionary Forces Subcommittee, the Department is committed to executing the Cooperative Maritime Strategy, modernizing our fleet, and building the fleet of tomorrow. The Navy urges your support to fully fund the Department's 2009 shipbuilding request. The Navy requests the Committee's support for the Navy's recent plan to truncate the DDG 1000 program at two ships and reopen the DDG 51 line to better align our surface combatant investment strategy with our nation's warfighting needs. The Navy continues to address the dynamic capability requirements of the Fleet while balancing the demands placed on limited resources and producing a plan that provides maximum stability for the industrial base. Modernizing the Fleet's cruisers and destroyers and executing an affordable shipbuilding plan are crucial to constructing and maintaining a 313 ship Navy with the capacity and capability to meet our country's global maritime needs. In an age of rapidly evolving threats and fiscal constraints, we must ensure we are building only to our highest priority requirements and that the mission sets we envision for the future represent the most likely of those potential futures.

Surface combatants are the workhorses of our Fleet and central to our traditional Navy core capabilities. Our cruisers, destroyers, and the new littoral combat ships bring capabilities to the fleet, that enable us to deter our enemies, project power, deploy forward and control the seas.

Strategic Environment

Rapidly evolving traditional and asymmetric threats continue to pose increasing challenges to Combatant Commanders. State actors and non-state actors who, in the past, have only posed limited threats in the littoral are expanding their reach beyond their own shores with improved capabilities in blue water submarine operations, advanced anti-ship cruise missiles and ballistic missiles. A number of countries who historically have only possessed regional military capabilities are investing in their Navy to extend their reach and influence as they compete in global markets. Our Navy will need to outpace other Navies in the blue water ocean environment as they extend their reach. This will require us to continue to improve our blue water anti-submarine and anti-ballistic missile capabilities in order to counter improving anti-access strategies.

The Navy remains committed to having the capability and capacity to win our Nation's wars and prevent future wars. The rise of violent extremism has become a greater threat as it rapidly evolves with diverse and adaptive capabilities. These often stateless organizations pose further challenges with their aspirations of weapons of mass destruction development and desire to proliferate missiles and other highly, technologically advanced weapons. All of these threats require the Navy to have the capacity to build partnerships and continue our efforts of investing in maritime domain awareness; intelligence, surveillance, and reconnaissance programs; and having both kinetic and non-kinetic effects capabilities. We call on our surface combatants to conduct these operations and execute the Maritime Strategy today, and we will continue to call on

them to provide maritime supremacy from the ungoverned spaces of the littorals to vast expanses of our world's oceans.

Challenges

The challenge for the Navy is to maintain traditional core naval capabilities while simultaneously enhancing our ability to conduct expanded core roles and missions to ensure naval power and influence can be applied on the sea, across the littorals, and ashore. It is no longer feasible or affordable to purchase the most capable, multi-mission platform and then limit its use to execute tailored mission areas or focus on specific threats. As asymmetric threats continue to evolve, so will traditional threats. The Navy must find affordable and adaptable ways to fill current and future warfighting gaps.

Beyond addressing capability requirements, the Navy needs to have the right capacity to remain a global deterrent and meet Combatant Commander warfighting requirements. Combatant Commanders continue to request more surface ships and increased naval presence to expand our cooperation with new partners in Africa, the Black Sea, the Baltic Region, and the Indian Ocean and maintain our relationships with our allies and friends. Therefore, we must increase surface combatant capacity in order to meet Combatant Commander demands today for ballistic missile defense, theater security cooperation, steady state security posture and to meet future demands as we standup Africa Command (AFRICOM) and the FOURTH Fleet in SOUTHERN Command. The Navy also continues to remain committed to our Ballistic Missile Defense partners around the globe, including Japan, Korea, the Netherlands, and Spain.

Future Force

The 30 year ship building plan was designed to field the force structure to meet the requirements of the national security strategy and the Quadrennial Defense Review meeting the FY 2020 threat. The 313-ship force floor represents the maximum acceptable risk in meeting the security demands of the 21st century. In the balance of capability and capacity, the Navy has found that there are increased warfighting gaps, particularly in the area of integrated air and missile defense capability. Capacity also matters, and capacity is capability for the Irregular War we are in today.

The DDG 1000 program is developing a capable ship which meets the requirements for which it was designed. The DDG 1000, with its Dual Band Radar and sonar suite design are optimized for the littoral environment. However, in the current program of record, the DDG 1000 cannot perform area air defense; specifically, it cannot successfully employ the Standard Missile-2 (SM-2), SM-3 or SM-6 and is incapable of conducting Ballistic Missile Defense. Although superior in littoral ASW, the DDG 1000 lower power sonar design is less effective in the blue water than DDG-51 capability. DDG 1000's Advanced Gun System (AGS) design provides enhanced Naval Fires Support capability in the littorals with increased survivability. However, with the accelerated advancement of precision munitions and targeting, excess fires capacity already exists from tactical aviation and organic USMC fires. Unfortunately, the DDG 1000 design sacrifices capacity for increased capability in an area where Navy already has, and is projected to have sufficient capacity and capability.

The DDG 51 is a proven, multi-mission guided missile destroyer. She is the Navy's most capable ship against ballistic missile threats and adds capacity to provide regional ballistic missile defense. DDG 51 spirals will better bridge the ballistic missile defense gap to the next generation Cruiser. Production costs of DDG 51s are known. The risks associated with re-opening the DDG 51 line are less than the risks of continuing the DDG 1000 class beyond 2 ships when balanced with the capability and capacity of pursuing the 313 ship fleet.

Current Execution

The Department is committed to executing the acquisition plan for our future force. Acquisition Professionals and Requirements Officers are working closely to maintain the Department's commitment to an affordable shipbuilding and modernization plan.

DDG 51 Destroyer Program and Production Restart Assessment

The capability of DDG 51 Class ships being built today is markedly more advanced than the initial ships of the class. The DDG 51 Class was developed in three incremental flights, with upgraded technology and capability built into each subsequent hull. Ships are currently being constructed at both General Dynamics (GD) Bath Iron Works (BIW) and Northrop Grumman Shipbuilding (NGSB). 62 ships have previously been authorized and appropriated, with the most recent procurement of three ships in FY 2005. A total of 53 ships have been delivered to the Navy. Five ships remain under construction at GD BIW, and 4 at NGSB. The last ship currently under construction, DDG 112, is scheduled

for delivery in FY 2011. All material for DDG 51 Class ships currently under construction has been procured, with the majority of the long lead material purchased in an Economic Order Quantity buy in FY 2002.

DDG 51 class production has been extremely stable, with successful serial production at both shipbuilders. Despite some setbacks, such as the impacts of Hurricane Katrina at NGSB, the costs associated with DDG 51 class shipbuilding are well understood. The Aegis Weapon System has been incrementally developed successfully to add increased capabilities and transition to the use of open architecture and increased use of commercial systems.

Additionally, the DDG 51 modernization program is currently modernizing the Hull, Mechanical, and Electrical (HM&E) and Combat Systems. These combined upgrades support a reduction in manpower and operating costs, achieve expected service life, and allow the class to pace the projected threat well into the 21st century.

Based upon a Navy assessment, including discussions with both current shipbuilders, to explore any subcontractor issues, a restart of DDG 51 procurement in FY 2009 is feasible. However, several ship and Government Furnished Equipment vendor base issues (including configuration change issues and production line re-starts) must be addressed in order to award and construct additional ships, which will increase ship costs above the most recently procured ships. The most notable being the restart of the DDG 51 reduction gear production. The Navy is confident that these issues can be resolved to

support a FY 2009 restart. DDG 51 class restart beyond FY 2009 presents significant risks and therefore additional costs.

However, both shipbuilders have indicated to the Navy that these lead time challenges can be mitigated with advance procurement and an adjusted build sequence, and that DDG 51 restart in FY 2009 is executable in both shipyards. Regarding the combat systems, the last production contracts were awarded in 2006. The cost and ease of restarting those production lines is a function of time, and part availability on military specification items which would need to be addressed.

Given the truncation of the DDG 1000 program at two ships, the Navy estimate for procurement of a single DDG 51 class ship in FY 2009 is $2.2 billion. This estimate utilizes the latest audited Forward Pricing Rate Agreements (FPRAs) rates. Impacts for production line restart and contractor furnished equipment/government furnished equipment obsolescence are included. The Navy has not finalized the acquisition strategy for a FY 2009 DDG 51 and follow-on procurements. The Navy will carefully consider stability of the industrial base during the planning of the specific strategy.

DDG 1000 Class Destroyer Program

The Navy remains ready to begin construction of DDG 1000. A rigorous systems engineering approach for the program has been employed to mitigate the risk involved with building a complex lead ship surface combatant. This approach included successful building and testing of the 10 critical technologies via Engineering Development Models.

Naval Vessel Rules were also fully incorporated prior to commencing detail design. Design of the Mission Systems is now nearly 100 percent complete. Detail design will be approximately 85 percent complete prior to the start of fabrication, and will be more complete than any other previous surface warship.

The systems engineering approach for DDG 1000 has been well conceived and well executed. However, overall, the remaining program risk involved in integrating the Mission Systems, 10 EDM's, and the ship detail design is still moderate. Particularly, the Dual Band Radar and Integrated Power System have further land-based testing to complete, and the software development for the Total Ship Computing Environment continues. Careful planning has been conducted so that where further development does continue on systems, these have been partially tested to the point that any potential changes are not likely to affect software or system interfaces, with a low risk of affecting either detail design or software development.

As such, the maturity of the ship design, critical technologies, and mission systems support commencement of production. However, it is accurate that the integration of a complex, lead ship, surface combatant with significant new technologies always entails risk. And though the Navy cost estimate for DDG 1000 is based on a detailed, bottoms-up approach, this complex integration does increase the cost risk.

Truncation of the program at two ships will result in cost impacts due to program shutdown, continuation of required class service tasks, and potential increased costs for DDG 1000 and 1001 and other programs. Additionally, the RDT&E efforts for the DDG

1000 program, which include software development and other critical efforts, must continue in order to deliver completed ships and in the CVN 78 Class.

Conclusion

Your Navy remains committed to building the fleet of the future and modernizing our current fleet. The Navy's top shipbuilding priority remains achieving a surface combatant shipbuilding program that is equally capable of assuring peace today and access to the global economy tomorrow regardless of the threats posed in an uncertain future. To accomplish this, we are steadfast in our intention to not use procurement accounts for other Navy program offsets. Procurement and R&D investments made today will serve our country and fleet well beyond 2020 as we modernize the fleet we have and build the fleet we need. Continuing to build DDG 51s enables us to expand warfighting capacity and capability in areas needed by Combatant Commanders and allows us to reach the 313 ship level sooner. Meeting evolving blue water and near-land threats that the DDG 51 can match provides less risk to the joint warfighter. There is less risk associated with the affordability of maintaining DDG 51 line versus continuing the DDG 1000 line. The Navy is ready to restart DDG 51 production, and is committed to successfully delivering DDG 1000 and 1001 from which, we will inform new ship class designs. The Navy has not finalized the acquisition strategy for FY 2009 DDG 51 and follow-on procurements, however acquisition planning is fully underway to execute this change in the Navy's shipbuilding requirements. The Department urges the Committee's support for full funding of the surface combatant procurement account for FY 2009 and approving our proposal regarding DDG's. Thank you for your continued

support and commitment to our Navy. I look forward to continuing to work closely with you to make our maritime services and nation more secure and prosperous.

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HOUSE ARMED SERVICES COMMITTEE

STATEMENT OF

RONALD O'ROURKE

SPECIALIST IN NAVAL AFFAIRS

CONGRESSIONAL RESEARCH SERVICE

BEFORE THE

HOUSE ARMED SERVICES COMMITTEE

SUBCOMMITTEE ON SEAPOWER AND EXPEDITIONARY FORCES

HEARING ON

SURFACE COMBATANT WARFIGHTING REQUIREMENTS AND ACQUISITION STRATEGY

JULY 31, 2008

NOT FOR PUBLICATION
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HOUSE ARMED SERVICES COMMITTEE

Chairman Taylor, Ranking Member Bartlett, distinguished members of the subcommittee, thank you for the opportunity to appear before you today to discuss destroyer procurement over the next several years. Press reports indicate that the Navy favors stopping DDG-1000 procurement at two ships and restarting DDG-51 procurement.[1] It has also been reported that the date for procuring the lead CG(X) cruiser may slip from FY2011 to FY2015 or later.[2] As requested, this statement discusses follow-on questions that would arise from a decision to stop DDG-1000 procurement and restart DDG-51 procurement, particularly in the context of a slip in the schedule for procuring the lead CG(X) to FY2015 or later. These questions include but are not limited to the following:

- What should be the design configuration of the DDG-51s that are procured?
- Should the program for modernizing DDG-51s be altered to change the configuration of the modernized ships?
- Should a non-combat ship equipped with a powerful radar be procured as an adjunct platform for improving the fleet's integrated air and missile defense (IAMD) capabilities pending the entry into service of CG(X)s?
- What options, in addition to procuring new DDG-51s, are available for helping to support the shipbuilding industrial base as destroyer production shifts from DDG-1000s back to DDG-51s?

This statement addresses each of these questions. It is based on information in the Navy program of record, past briefings and other information provided by the Navy and industry to CRS on the DDG-51 and DDG-1000 programs,[3] recent industry briefings to CRS that were done at CRS' request, and open-source information, including press reports and recent DOD and Navy letters to Congress that have been made public.

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[1]See, for example, Christopher P. Cavas, "DDG 1000 Program Will End at Two Ships," *DefenseNews.com*, July 22, 2008; Christopher J. Castelli, "Plan To Curtail DDG-1000 Program Advances," *InsideDefense.com*, July 22, 2008; Geoff Fein, "Navy To Buy Eight DDG-51s As It Cancels Further Zumwalt Buys," *Defense Daily*, June 25, 2008.

[2]Christopher P. Cavas, "DDG 1000 Destroyer Program Facing Major Cuts," *DefenseNews.com*, July 14, 2008.

[3]On July 14, 2008, CRS asked the Navy to provide a briefing to CRS on the issue of procuring DDG-1000s or DDG-51s; on July 15, 2008, the Navy replied that it preferred not to provide such a briefing at this time, as the topic related to excursions being done in support of the proposed FY2010 budget to be submitted early next year.

Configuration of New DDG-51s

Although the discussion to date about restarting DDG-51 production has focused on procuring repeat copies of the current Flight IIA DDG-51 design, policymakers may consider the alternative of procuring a modified version of the DDG-51 design. A modified version could have lower annual operating and support (O&S) costs, and could be better aligned with a potential policy goal of using DDG-51 procurement to improve the fleet's capabilities for naval surface fire support (NSFS) or IAMD. (A Navy interest in improving NSFS capabilities helped give rise to the DDG-1000 program, and the Navy had wanted to start improving its IAMD capabilities in FY2011 through procurement of CG(X)s.) In deciding whether destroyer procurement over the next several years should focus on providing improved NSFS capabilities or improved IAMD capabilities, policymakers could consider several factors, including current and potential U.S. Navy operations, the operational requirements for conducting these operations, current and projected threats or challenges associated with these operations, and current or projected Navy or DOD programs (other than destroyer procurement) for countering these threats or overcoming these challenges.[4]

A key system for providing improved NSFS capability is the 155mm Advanced Gun System (AGS) and the associated 155mm Long Range Land Attack Projectile (LRLAP). Key systems for providing improved IAMD capabilities include higher-capability radars and vertical-launch tubes for IAMD interceptors.

The Navy has procured different versions of the DDG-51 design over time. A significant change in the design occurred in FY1994, when the Navy shifted DDG-51 procurement to the Flight IIA version of the ship, which included, among other things, the addition of a helicopter hangar and the repositioning of the ship's aft SPY-1 radar arrays. Prior to implementing the Flight IIA design, the Navy seriously considered a version with even larger-scale changes, called the Flight III design, that would have included, among other things, lengthening the ship's hull to make room for additional mission systems.

Compared to the option of procuring repeat Flight IIA DDG-51s, procuring a modified version of the DDG-51 design would incur additional nonrecurring design and engineering costs, as well as additional recurring production costs due to loss of learning at the shipyard associated with changing the ship's design and (for some of the options discussed below), the enlargement of the ship. Depending on the exact option pursued, the nonrecurring design and engineering costs could total in the hundreds of millions of dollars. Given the number of DDG-51s that may be procured between now and the procurement of a lead CG(X) in FY2015, FY2016, or FY2017, these additional costs might be deemed cost effective in terms of making it possible to procure DDG-51s that have lower O&S costs and are better aligned with a possible policy goal of using DDG-51 procurement to provide the fleet with improved NSFS or IAMD capabilities.

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[4] A July 25, 2008, press article discussed the Navy's preference to stop DDG-1000 procurement at two ships and restart DDG-51 procurement. The article quoted Commander Jeff Davis, a Navy spokesman, as follows: "'DDG-51 is a proven multi-mission ship that better meets our needs, particularly Integrated Air Missile Defense (IAMD), Ballistic Missile Defense (BMD), and Anti-Submarine Warfare (ASW),' Davis said." (Geoff Fein, "Navy To Buy Eight DDG-51s As It Cancels Further Zumwalt Buys," *Defense Daily*, June 25, 2008. In the article as published, this sentence lacked quote marks. CRS on July 28, 2008, confirmed with Defense Daily that this was a direct quote from Davis and that the quote marks were left out by mistake.)

DDG-51 configuration options that may be procured in coming years include but are not limited to the following:

- the current Flight IIA design;
- a modified version with additional features for reducing O&S costs;
- a modified version with additional features for reducing O&S costs and an AGS;
- a modified version with additional features for reducing O&S costs and additional vertical-launch tubes;
- a modified version with additional features for reducing O&S costs and an improved radar; and
- a modified version with additional features for reducing O&S costs, additional vertical-launch tubes, and an improved radar.

Each of these options is discussed below. The first of these options might be ready for implementation sooner than the others. If so, and if procurement of a modified DDG-51 design were desired, procurement of DDG-51s over the next several years could begin with procurement of the current Flight IIA design and then shift to the modified design when the modified design was ready for procurement.

Although the option of procuring the current Flight IIA DDG-51 design might be ready for implementation sooner than the other options, the Navy and other observers have cautioned that the time line for restarting procurement of the current Flight IIA design could be extended by the need to restart or reestablish vendors for certain key DDG-51 components, such as the reduction gear.

Current Flight IIA Design

This option, which might be considered the baseline option, has the lowest nonrecurring design and engineering costs and the lowest recurring production costs of all the options presented here. It would maximize the number of DDG-51s that could be procured for a given amount of procurement funding. It would also pose the lowest amount of technical, schedule, and cost risk. It would have higher life-cycle O&S costs then the next option discussed below, and perhaps higher O&S costs than some of the other options discussed below as well. Procuring the current Flight IIA design would provide more of the same capabilities that DDG-51s currently provide for the fleet, but the ships might not be considered particularly well-aligned if a possible policy goal was to use DDG-51 procurement to provide improved (as opposed to additional) capabilities for NSFS or IAMD. As mentioned above, the current Flight IIA design could be procured as a bridge to procurement of one of the modified designs discussed below.

Version With Features for Reducing O&S Costs

This option would procure Flight IIA ships that were modified to include features for reducing the ships' annual O&S costs. Potential features of this kind include but are not limited to the following:

- adding automated equipment and making other changes to reduce crew size;
- adding some electric-drive equipment for interconnecting parts of the ship's mechanical-drive propulsion system so as to permit the system to operate more like an integrated electric drive system; and
- installing a near-surface bow bulb above the existing sonar dome to improve hydrodynamic efficiency.

The discussion below of how these three features could reduce DDG-51 O&S costs uses as its starting point the table below on annual DDG-1000 and DDG-51 O&S costs, which is reprinted from Admiral Gary Roughead's May 7, 2008, letter to Senator Kennedy on the DDG-1000 and DDG-51.[5]

(FY$M)	DDG 1000	DDG 51
Operating (steaming)	$18.5	$15.7
Maintenance	$10.3	$5.6
Manpower	$8.5	$19.9
Total	$37.3	$41.2
Crew Size	[Total 120] 14 officers 106 enlisted	[Total 296] 24 Officers 272 Enlisted

Source: Letter dated May 7, 2008, from Admiral G. Roughead to the Honorable Edward M. Kennedy, p. 2. The figures shown in brackets for total crew size were added to the table by CRS.

Reducing Crew Size. Admiral Roughead's letter states that the above table "does not include personnel reduction savings expected from the DDG Modernization program." The Navy informed CRS on July 25, 2008, that the DDG-51 modernization is not expected to reduce DDG-51 crew size, but that the size of the DDG-51 crew has, for other reasons, been reduced recently from the figure of 296 shown in the table to 278, a reduction of 18 people.[6]

Additional actions might permit a further reduction in DDG-51 crew size: A 2003 industry briefing to CRS on DDG-51 modernization for reduced manning discussed various steps for reducing crew size by about 100.[7] The House Armed Services Committee's report (H.Rept. 108-491 of May 14, 2004) on the FY2005 defense authorization bill (H.R. 4200) similarly stated:

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[5]Source: Letter dated May 7, 2008, from Admiral G. Roughead to the Honorable Edward M. Kennedy, posted on the Internet at InsideDefense.com (subscription required) on May 30, 2008.

[6]Source: Navy information provided to CRS by telephone, July 25, 2008.

[7]Source: Industry briefing to CRS on DDG-51 modernization for reduced manning, August 8, 2003.

> The committee notes that the Navy is scheduled to commence a DDG-51 modernization plan in fiscal year 2005 with new construction and subsequently extend modernization to in-service destroyers. The committee is aware that the foundations for DDG-51 modernization are: increased warfighting capability, leverage of the DDG–51 shipbuilding program, reduction of total ship ownership costs, and use of open architecture. In addition to those factors, the committee believes that reduction in crew size from the present approximately 300 to an objective of 200 personnel should also be part of the foundation of an even more aggressive modernization program.
>
> According to the Navy, a DDG-51 class ship costs $25.0 million per year to operate, including $13.0 million for the crew. The Navy estimate is that its present modernization plan could reduce the crew cost per ship by $2.7 million per year. A larger reduction in crew size would clearly appear to result in significant savings over the estimated 18 years of remaining normal service life, especially noting that per capita personnel costs may be expected to increase during that period.[8]

Using the figures in the table from Admiral Roughead's May 7 letter, if additional steps can reduce ship crew size by another 32 people, for a total reduction of 50 — one-half the figure of 100 mentioned in the 2003 industry briefing and the 2004 committee report — then annual manpower costs for the DDG-51 could be reduced from the figure of $19.9 million shown in the table to about $16.5 million, a reduction of about 17%.

Addition of Some Electric-Drive Equipment. As discussed in two CRS reports,[9] one maker of electric-drive propulsion equipment has proposed increasing the planned scope of the Navy's program for modernizing its DDG-51s to include adding some electric-drive propulsion equipment to the ships' existing mechanical-drive propulsion plants. The option could also be applied to new-construction DDG-51s. The added equipment would more fully interconnect the mechanical-drive components on each ship, producing what the firm refers to as a hybrid propulsion plant. The firm estimates that the addition of this equipment would reduce DDG-51 fuel use by about 16%. This option, the firm estimates, would have a non-recurring engineering cost of $17.1 million and a recurring cost (including both equipment cost and installation cost) of $8.8 million per ship.[10]

Using the figures in the table from Admiral Roughead's May 7 letter, reducing DDG-51 fuel use by 16% would reduce the ship's annual operating (steaming) cost from the figure of $15.7 million shown in the table to about $13.2 million — a reduction of about $2.5 million. The Navy has informed CRS that the operating (steaming) cost figures in the May 7 letter are based on fuel costs as of February 2008 and reflect a crude oil cost of $112.14 per barrel.[11] If crude oil in coming years costs more than $112.14 per barrel, the dollar savings associated with a 3.9% reduction in fuel

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[8]H.Rept. 108-491, pp. 122-123.

[9]CRS Report RL33360, *Navy Ship Propulsion Technologies: Options for Reducing Oil Use — Background for Congress*, by Ronald O'Rourke, and CRS Report RS22595, *Navy Aegis Cruiser and Destroyer Modernization: Background and Issues for Congress*, by Ronald O'Rourke.

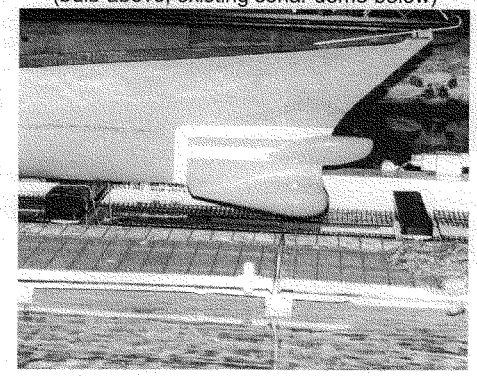
[10]Source: Briefing by the firm DRS dated December 19, 2007, with estimated percentage fuel-savings and cost figures reconfirmed by telephone call with CRS on July 17, 2008. DRS also stated in the phone call that one Navy official had stated that the reduction in fuel use could be greater than DRS estimates because the commanders of ships with this equipment would likely adjust ship speeds to operate the ship more often at the hybrid system's most-efficient speed points (i.e., the system's "sweet spots").

[11]Source: Navy information provided to CRS by telephone, July 25, 2008.

use would be greater than $2.5 million per year. The obverse would be true if crude oil in coming years costs less than $112.14 per barrel.

Adding a Near-Surface Bow Bulb. As discussed in a CRS report,[12] a study by the Navy's David Taylor Model Basin estimated that fitting a near-surface bow bulb — essentially a shaped piece of steel — onto a DDG-51class destroyer could reduce its fuel use by 3.9%.[13]

Figure 1. Near-Surface Bow Bulb Design for DDG-51
(bulb above, existing sonar dome below)



A document from the hydromechanics department of the Naval Surface Warfare Center Carderock Directorate summarizing efforts by that department through 1999 to improve the

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[12]CRS Report RL33360, *Navy Ship Propulsion Technologies: Options for Reducing Oil Use — Background for Congress*, by Ronald O'Rourke.

[13]Dominic S. Cusanelli, "Stern Flaps and Bow Bulbs for Existing Vessels, Reducing Shipboard Fuel Consumption and Emissions," available online at: [http://www.unep.fr/ozonaction/events/military/proceedings/Presentation%20Material/24%20-%20Cusanelli%20-%20SternFlaps.doc]. The study is undated but refers to a test that was "recently completed in Dec. 2000." As also stated in CRS Report RL33360, an earlier (1994) study by the same organization estimated that 79 existing Navy cruisers and destroyers could be fitted with bow bulbs for a total development and installation cost of less than $30 million, and that the constant-dollar life-cycle fuel savings of the 79 ships would be $250 million. (Dominic S. Cusanelli, "Development of a Bow for a Naval Surface Combatant which Combines a Hydrodynamic Bulb and a Sonar Dome," paper presented at the American Society of Naval Engineers Technical Innovation Symposium, September 1994, available online at [http://www50.dt.navy.mil/reports/hydrobulb/].) DOD stated in 2000 that fitting bulbous bows onto 50 DDG-51s (a total of 62 DDG-51s have been procured) could save $200 million in life-cycle fuel costs. (U.S. Department of Defense, *Climate Change, Energy Efficiency, and Ozone Protection, Protecting National Security and the Environment*. Washington, 2000. (Office of the Deputy Under Secretary of Defense (Environmental Security), November 2000) p. 5. Available online at [https://www.denix.osd.mil/denix/Public/Library/Air/Climate_Change/dodclimatechange.pdf].)

hydrodynamic and operational performance of the DDG-51 similarly states that in tests of this proposal:

> Ship performance improvement was projected for the entire ship speed range across all sea states tested, resulting in significant annual fuel savings.
>
> Analysis of seakeeping data and extreme sea wave load tests indicate that the bow bulb had no significant impact on ship motions or hull girder loads. Acoustic transfer function tests data from a vibracoustic model concluded that the bow bulb should have little noticeable impact on the sonar self-noise levels.[14]

Using the figures in the table from Admiral Roughead's May 7 letter, reducing DDG-51 use by an additional 3.9% would reduce the ship's annual operating (steaming) cost from the figure of $15.7 million shown in the table to about $12.7 million — a reduction of $3.0 million. This savings figure is again based on a crude oil cost of $112.14 per barrel.

Summary of Potential O&S Cost Reductions. **Table 1** below summarizes the potential reductions in annual DDG-51 O&S costs from the three options discussed above. The total figure of $34.8 million shown in the final column of the table is about 15% less than the figure of $41.2 million from the table in Admiral Roughead's May 7 letter. These figures would need to be adjusted for the options discussed later in this statement to take into account the configuration changes of those options.

Table 1. DDG-1000 and DDG-51 Annual O&S Costs

(FY$M)	DDG 1000	DDG 51	DDG 51 with potential O&S cost reductions
Operating (steaming)	$18.5	$15.7	$12.7
Maintenance	$10.3	$5.6	$5.6
Manpower	$8.5	$19.9	$16.5
Total	$37.3	$41.2	$34.8
Crew Size	120 Total (14 officers 106 enlisted)	296 Total (24 Officers 272 Enlisted)	246 Total

Source: Letter dated May 7, 2008, from Admiral G. Roughead to the Honorable Edward M. Kennedy, p. 2 (first two data columns) and CRS review of Navy and industry data (third data column).

[14]Document entitled "Recent Design Programs, DDG 51," available online at: [http://www.nswccd.navy.mil/hyd/mul-gal/doc-gal-1/documents/DDG51.pdf].

Version With Reduced O&S Costs and An AGS

This version of the DDG-51 design would include an AGS as well as features for reducing O&S costs. The purpose in procuring this version would be to provide the fleet with improved NSFS capabilities. Under this option, the Flight IIA design would be modified by removing the 5-inch gun and perhaps also the forward 32-cell vertical launch system (VLS) battery, lengthening the ship forward of the deckhouse through the insertion of a hull plug, and installing an AGS with a magazine capable of storing as many LRLAP rounds as can be fitted, with a goal of 300.

Some of the sources that CRS consulted expressed doubts or concerns about the technical feasibility or engineering difficulty of this option. Other sources expressed fewer concerns along these lines. A redesign of the AGS's ammunition storage and handling space would be needed to accommodate the AGS in the DDG-51 hull.

The Navy informed CRS in 2005 that it might be possible to fit the existing DDG-51 hull with one AGS, that doing so would likely require the removal of 5-inch gun and the forward 32-cell VLS battery, and that in this configuration, the DDG-51 might carry about 120 LRLAPs.[15]

At a March 14, 2008, hearing on shipbuilding issues before this subcommittee, Vice Admiral Barry McCullough was asked what platforms other than the DDG-1000 might be equipped with an AGS. He replied:

> Well, sir, I will tell you we looked at [whether] could you put the Advanced Gun System in an Arleigh Burke [DDG-51] hull. And without doing a detailed shock analysis on it, I will tell you physically it fits. We'd have to do some arrangement changes in it. But you can put the gun in there. And my concern is the magazine capacity. Outside of that, we haven't looked at putting it in any other hull form. So I'll get back to you on that.[16]

This comment, like the information that the Navy provided to CRS in 2005, appears to relate to an installation that does not involve lengthening the DDG-51 hull. Lengthening the DDG-51 hull forward of the deckhouse could provide additional space and weight-carrying capacity for additional LRLAP rounds, and perhaps also permit the retention of the forward 32-cell VLS battery. The Navy and industry in the past have studied options for lengthening the DDG-51 hull by various lengths to accommodate various capability upgrades, such as additional VLS cells;[17] the maximum possible

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[15]Source: Navy briefing to CRS on DDG-1000 and DDG-51 capabilities, June 10, 2005.

[16]Source: Transcript of hearing. The idea of backfitting an AGS onto an existing Spruance (DD-963) class destroyer, so that the ship could be used as a risk-reduction platform for the DDG-1000, was explored by a group of three Navy lieutenants in a 2003 study done while at the Massachusetts Institute of Technology. The study's preferred installation option, which involved the removal of the ship's aft 5-inch gun but no hull extension, resulted in a magazine with an estimated capacity of 304 LRLAP rounds. (Julie Higgins, Jason Rhoads, and Michael Roach, *Advanced Gun System (AGS) Backfit, DD-988 Naval Gunfire Support Ship Conversion*, Massachusetts Institute of Technology, 13.413, Project in Naval Ship Construction, Spring 2003, 30 pp.)

[17]For example, the Navy in 1988 studied design options for a Flight III version of the DDG-51 design that included hull extensions, in various locations along the hull, of 30 feet, 40 feet, and 46 feet. The CNO gave initial approval to a Flight III design concept incorporating a 40-foot extension (12 feet forward and 28 feet

(continued...)

hull extension might be 55 or 56 feet.[18] An extension of 55 or 56 feet might permit a magazine of more than 300 rounds, or alternatively might permit the retention of at least some of the ship's forward VLS cells.

Because the AGS requires much more electrical power to operate than the DDG-51's current 5-inch gun, equipping the DDG-51 with an AGS might require the installation of an additional electrical generator. The best location for such a generator might be in one of the ship's two helicopter hangar spots, which would reduce the ship's helicopter hangar capacity from two helicopters to one.

Version With Reduced O&S Costs and Additional Vertical-Launch Tubes

This version of the DDG-51 design would include additional vertical-launch tubes as well as features for reducing O&S costs. The purpose in procuring this version would be to provide the fleet with improved IAMD capabilities.

Additional vertical-launch tubes could be installed by lengthening the ship's hull forward of the deckhouse. A 1994 CRS report discussed, on the basis of Navy information, how a 12-foot extension could permit the installation of 32 additional VLS cells.[19] In 1997, to support research that CRS was conducting into possible alternatives to the Navy's proposed Arsenal Ship,[20] the Navy provided CRS with information on how lengthening the DDG-51 hull so as to install additional VLS tubes might change the ship's procurement cost. The information is summarized in **Table 2** below. The estimated changes in procurement cost were parametric, rough order of magnitude (ROM) estimates only, subject to further engineering evaluation, and did not include detail design or nonrecurring engineering costs. Although the table shows variants equipped with Mk 41 VLS tubes (the kind currently used on Navy surface ships), adding vertical launch tubes of a newer design may also be possible.

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[17](...continued)
aft), and the design was intended to begin procurement in FY1994. (Source: Donald Ewing, Randall Fortune, Brian Rochon, and Robert Scott, *DDG 51 Flight III Design Development*, Presented at the Meeting of the Chesapeake Section of The Society of Naval Architects and Marine Engineers, December 12, 1989.) The Flight III design was canceled in late-1990/early-1991. Subsequent studies led to the current Flight IIA design, which does not include a hull extension. A 1994 CRS report discussed the option of lengthening the DDG-51 design by about 12 feet to increase the forward VLS battery from 32 cells to 64 cells. (See CRS Report 94-343 F, *Navy DDG-51 Destroyer Procurement Rate: Issues and Options for Congress*, by Ronald O'Rourke [April 25, 1994; out of print and available directly from the author]), pp. CRS-27 to CRS-28.

[18]Sources: Recent discussions with industry officials and Navy information provided to CRS in 1997.

[19]See CRS Report 94-343 F, *Navy DDG-51 Destroyer Procurement Rate: Issues and Options for Congress*, by Ronald O'Rourke [April 25, 1994; out of print and available directly from the author]), pp. CRS-27 to CRS-28.

[20]The Arsenal Ship program was aimed at acquiring a small number of relatively simple and inexpensive surface ships, each armed with about 512 VLS tubes. The program was cancelled in 1997. For more on the program, see CRS Report 97-455 F, *Navy/DARPA Arsenal Ship Program: Issues and Options for Congress*, by Ronald O'Rourke, and CRS Report 97-1004 F, *Navy/DARPA Maritime Fire Support Demonstrator (Arsenal Ship) Program: Issues Arising From Its Termination*, by Ronald O'Rourke.

Table 2. 1997 Navy Information on DDG-51 Variants With Additional VLS Tubes

Variant	Number of Mk 41 VLS tubes (% change relative to Flight IIA)	Number of 5-inch guns	Hull extension (in feet)	Rough recurring procurement cost (relative to Flight IIA)
Current Flight IIA design	96	1	0	1.00
Option 1	128 (+ 33%)	1	12[a]	<1.05
Option 2	160 (+ 67%)	1	30	<1.10
Option 3	192 (+100%)	1	<56	<1.15
Option 4	256 (+167%)	1	56	<1.20

Source: U.S. Navy data provided to CRS on April 9, 1997, except for the figure of 12 feet shown for the variant with 32 additional VLS cells, which is U.S. Navy data provided for CRS Report 94-343 F, *Navy DDG-51 Destroyer Procurement Rate: Issues and Options for Congress*, by Ronald O'Rourke [April 25, 1994; out of print and available directly from the author]). The cost figures in the table are rough order of magnitude (ROM) estimates and do not reflect any detailed design or engineering costs typically reflected in a lead-ship cost. The cost estimates provided by the Navy to CRS, though ROM estimates, were more precise than shown here, and were labeled business sensitive. They have been rendered more approximate by CRS for presentation in this table. The costs of the options as estimated by the Navy did not differ from one another in exact increments of 5%. See also Figure 6 on page 131 from Dean A. Rains, "Methods For Ship Military Effectiveness Analysis," *Naval Engineers Journal*, March 1994: 126-135; and Table 3 on page 26 from Dean A. Rains, "Naval Ship Affordability," *Naval Engineers Journal*, July 1996: 19-30.

As shown in the table, all these options retain the DDG-51's 5-inch gun. If the gun is considered not critical for the ship's intended concept of operations, it could be eliminated from the design, which would reduce the design's procurement cost. Supporters of eliminating the 5-inch gun might argue that the gun is not critical because it does not contribute to a goal of providing improved IAMD capabilities, and because the Navy already has 106 5-inch guns on 22 existing Aegis cruisers (two guns each) and 62 DDG-51s already in service or under construction (one gun each). Opponents of eliminating the 5-inch gun could argue that the absence of a gun would reduce the mission flexibility of the ship.

Version With Reduced O&S Costs and An Improved Radar

This version of the DDG-51 design would include an improved radar in the place of the DDG-51's current SPY-1 radar, as well as features for reducing O&S costs. The purpose in procuring this version would be to provide the fleet with improved IAMD capabilities.

The improved radar would use active-array radar technology, as opposed to the older passive-array technology used in the SPY-1. The active-array technology would be similar to that used, for example, in the DDG-1000 dual band radar. Multiple industry sources have briefed CRS on their proposals for modifying the DDG-51 design to include an active-array radar with greater capability than the SPY-1.

If the DDG-51 hull is not lengthened, then modifying the DDG-51 design to include an improved radar would require removing the 5-inch gun to make space and weight available for additional equipment needed to support operations with the improved radar. Lengthening the hull might provide enough additional space and weight capacity to permit the 5-inch gun to be retained.[21] Supporting equipment to be installed would include an additional electrical generator and additional cooling equipment.[22] The best location for the generator might be in one of the ship's two helicopter hangar spots, which would reduce the ship's helicopter hangar capacity from two helicopters to one.

Due to the higher cost of the improved radar compared to the SPY-1 and the cost for the additional generator and cooling equipment, modifying the DDG-51 design to this configuration would increase the recurring procurement cost of the ship. Information provided to CRS by industry suggests that if the hull is not lengthened, the increase might be in the general range of $100 million, or perhaps or more. If the hull were lengthened, the cost increase would be greater.

Version With Reduced O&S, Additional Tubes, and An Improved Radar

This version of the DDG-51 design would include both additional vertical-launch tubes and an improved radar, as well as features for reducing O&S costs. The purpose in procuring this version would be to provide the fleet with improved IAMD capabilities. This option would require the hull to be lengthened. The resulting ship would be more expensive in all respects (nonrecurring design and engineering costs, procurement costs, and annual O&S costs) and more capable than the other options discussed here.[23] If the ship's hull were lengthened by 55 or 56 feet, the resulting ship might be roughly 25% more expensive to procure than the current Flight IIA design, or perhaps more than that.

DDG-51 Modernization Program

In the context of a decision to stop DDG-1000 procurement and restart DDG-51 procurement, policymakers may consider the option of altering the current program for modernizing existing DDG-51s so as to produce modernized ships with configurations similar to the modified configurations discussed above for new-construction DDG-51s. Each of the modified configurations discussed above might be achievable through modernizations of existing DDG-51s.

Altering the DDG-51 modernization program to include such changes to the ship configuration would:

- increase the cost of the modernization program;

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[21]Some sources consulted by CRS believe that the 5-inch gun could be retained, even if the hull is not lengthened.

[22]Some sources consulted by CRS believe that an additional electrical generator might not be needed.

[23]Depending on the amount of reduction in annual O&S costs, it is possible that this ship might be comparable to, or less expensive than, a baseline DDG-51 Flight IIA in terms of annual O&S costs.

- increase the amount of shipyard work associated with each modernization, which could have implications for supporting the shipbuilding industrial base (see discussion below);
- produce ships with lower O&S costs than currently planned;
- produce ships that are aligned more closely with a possible policy goal of providing the fleet with improved NSFS or IAMD capabilities; and
- permit the modernization effort to produce ships with improved NSFS capabilities while the new-construction effort produces ships with improved IAMD capabilities, or vice versa, thus pursuing both of these potential policy goals.

Non-Combat Adjunct Ship With Powerful Radar

If DDG-51s are procured or modernized with an eye toward providing improved IAMD capabilities, another option that policymakers may consider would be to procure a non-combat ship equipped with a powerful radar to act as an adjunct platform for missile defense operations and perhaps also air defense operations. The radar on the ship would be a large, active-array radar that would be considerably more powerful than the improved radar that could be installed on a modified DDG-51. The presence in the fleet of such a radar could significantly improve the fleet's IAMD capabilities. The ship might be similar to the Cobra Judy Replacement ship currently under construction. A few or several such adjunct ships might be procured, depending on the number of theaters to be covered, requirements for maintaining forward deployments of such ships, and their homeporting arrangements. The ships would have little or no self-defense capability and would need to be protected in threat situations by other Navy ships.

Supporting the Shipbuilding Industrial Base

Policymakers have expressed concern about the potential impact on the shipbuilding industrial base over the next several years of a decision to stop DDG-1000 procurement and restart DDG-51 procurement. Particular concern has been expressed about General Dynamics' Bath Iron Works (GD/BIW) of Bath, ME, since construction of surface combatants is that yard's primary source of work.

The Navy informed CRS on March 11, 2008, that a DDG-1000 would require, by Navy estimates, about 2.5 times as much shipyard labor to build as would be required to build a DDG-51.[24] On April 10, 2008, the Navy clarified that this ratio was based on the number of labor hours that the Navy estimates will be needed to build the first two DDG-1000s, and that subsequent DDG-1000s would require smaller amounts of shipyard labor, reducing the ratio for subsequent ships to something less than 2.5 to 1.[25] (The DDG-51 design, in contrast, is already well down its learning curve and would not decline by a substantial additional amount through additional production.)

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[24]Source: Navy Office of Legislative Affairs telephone call to CRS on March 11, 2008.

[25]Source: Navy briefing to CRS and CBO on April 10, 2008.

Assuming a rate of learning in the DDG-1000 production process that might be typical for a complex combatant ship, and taking into account the shared production arrangement for the DDG-1000, a seventh DDG-1000 might require roughly 1.7 to 1.9 times as much shipyard labor to build as a baseline Flight IIA DDG-51. Other calculations based on these factors include the following:

- ships 3 through 7 in a 7-ship DDG-1000 program might provide the equivalent of roughly 9.3 to 10.3 baseline Flight IIA DDG-51s' worth of shipyard labor hours;

- the shipyard that was the primary yard for building ships 3, 5, and 7 in a 7-ship DDG-1000 program would receive a total of roughly 5.1 to 5.7 baseline Flight IIA DDG-51s' worth of shipyard hours for its role in building ships 3 through 7 in a 7-ship DDG-1000 program; and

- the shipyard that was the primary yard for building ships 4 and 6 in a 7-ship DDG-1000 program would receive a total of roughly 4.2 to 4.6 baseline Flight IIA DDG-51s' worth of shipyard labor hours for its role in building ships 3 through 7 in a 7-ship DDG-1000 program.[26]

These figures suggest that if policymakers desire to fully replace the shipyard labor hours that would have been provided by ships 3 through 7 in a 7-ship DDG-1000 program, and if procurement of DDG-51s of some kind through FY2013 (the year in which the seventh DDG-1000 was scheduled for procurement) provides less than the equivalent of roughly 9.3 to 10.3 baseline Flight IIA DDG-51s' worth of shipyard labor hours, then one or more of the options listed below for supplementing DDG-51 construction work with other forms of work might be considered.

In addition to total shipyard hours, another factor to consider for maintaining the shipyards is whether the mix of work being pursued preserves critical ship-construction skills, including outfitting skills and combat system integration skills. The options listed below for supplementing DDG-51 construction work would support such skills to varying degrees.

There are multiple options for supplementing DDG-51 construction work so as to support the shipbuilding industrial base over the next several years, including but not limited to the following:

- assigning DDG-51 modernizations to the two yards that built the ships — GD/BIW and the Ingalls yard at Pascagoula, MS, that forms part of Northrop Grumman Shipbuilding (NGSB);

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[26]Source: CRS calculation based on a CRS assumption of:
— a smooth learning curve of 85% to 90% for the DDG-1000 program;
— a unified learning curve for the portions of every DDG-1000 that are to be built by only one single firm; and
— a split learning curve for the portion of each DDG-1000 that is to be built by the yard performing the final-assembly work on the ship.
For a discussion of shipbuilding learning curves, see CRS Report 96-785 F, *Navy Major Shipbuilding Programs and Shipbuilders: Issues and Options for Congress*, by Ronald O'Rourke, pp. 95-110. [out of print and available directly from the author]

- assigning Aegis cruiser (i.e., CG-47 class) modernizations to the two yards that built the ships (again, GD/BIW and the Ingalls yard);
- procuring adjunct non-combat radar ships as described earlier in this statement and assigning the construction of those ships to GD/BIW and/or NGSB;
- having GD/BIW participate in the construction of Littoral Combat Ships that are built to the General Dynamics LCS design;
- procuring one or more LPD-17s beyond those in the Navy's shipbuilding plan, and perhaps have GD/BIW build parts of those ships (similar to how GD/BIW is currently building parts of LPD-24 for NGSB);[27]
- procuring additional LHA-type amphibious assault ships, and perhaps have GD/BIW build parts of those ships;[28]
- procuring AGS-armed versions of the basic LPD-17 class hull — another option that has been suggested for improving the fleet's NSFS capabilities (see **Appendix A** to this statement) — and perhaps have GD/BIW builds parts of those ships;
- procuring a third and final DDG-1000;[29]
- procuring two new polar icebreakers for the Coast Guard, and assigning construction of those ships to NGSB and/or GD/BIW;[30] and
- accelerating the procurement of National Security Cutters (NSCs) for the Coast Guard (NSCs are built at NGSB).

Some of these options would be available for implementation sooner than others. Those available the soonest might be of the most use for bridging a work gap between the winding down of DDG-1000 production and the restart of DDG-51 production. As mentioned earlier, the Navy and

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[27]GD/BIW was originally slated to build 4 of a then-planned class of 12 LPD-17s, and is currently building parts of LPD-24, the eighth ship in the class. NGSB has subcontracted parts of other LPD-17s to a shipyard in Texas.

[28]For additional discussion of the amphibious lift goal and the numbers of amphibious ships that might be procured to support that goal, see CRS Report RL34476, *Navy LPD-17 Amphibious Ship Procurement: Background, Issues, and Options for Congress*, by Ronald O'Rourke.

[29]Procurement of a third and final DDG-1000 could be viewed as somewhat analogous to the procurement of the third and final Seawolf (SSN-21) class submarine, which was procured in part to help maintain the submarine construction industrial base while the successor Virginia (SSN-774) class design was being readied for procurement.

[30]For a discussion of the option of procuring new polar icebreakers for the Coast Guard, see CRS Report RL34391, *Coast Guard Polar Icebreaker Modernization: Background, Issues, and Options for Congress*, by Ronald O'Rourke. The procurement of the Coast Guard's newest polar icebreaker, Healy (WAGB-20), was funded in FY1990 through the Navy's shipbuilding budget (the Shipbuilding and Conversion, Navy [SCN] appropriation account).

other observers have cautioned that the time line for restarting procurement of the current Flight IIA design could be extended by the need to restart or reestablish vendors for certain key DDG-51 components.

Increasing the scope of work to be performed in the DDG-51 modernization program to include configuration changes like those discussed earlier in this statement could increase the amount of work that would be provided by the first option above. Similarly, increasing the scope of work to be performed in the CG-47 modernization program to include the installation of an improved radar (an option discussed in **Appendix B** to this statement) could increase the amount of work that would be provided by the second option above.

Procuring additional ships to be built at NGSB could help support GD/BIW, even if GD/BIW does not share in their production, by permitting a greater share of DDG-51 construction work to be assigned to GD/BIW while still adequately supporting NGSB.

Mr. Chairman, distinguished members of the subcommittee, this concludes my testimony. Thank you again for the opportunity to appear before you to discuss these issues. I will be pleased to respond to any questions you might have.

Appendix A. Non-DDG-51 Options for Improved NSFS or IAMD Capabilities

This appendix presents a brief summary of some non-DDG-51 ship procurement and modernization options for improving the fleet's NSFS or IAMD capabilities.

Non-DDG-51 Options For Improved NSFS

Non-DDG-51 options for providing improved NSFS capabilities include but are not necessarily limited to the following:

- **Procuring the current DDG-1000 design.** The current DDG-1000 design was developed to provide improved capabilities for NSFS and therefore does not need to be modified to be aligned with such a goal. The DDG-100 design includes, among other features, two AGSs, each with a magazine capable of 300 LRLAP rounds, for a total of 600 rounds. The DDG-1000 is also designed to take on additional LRLAP rounds while it is firing LRLAPs, creating what has been called an "infinite magazine."

- **Procuring a modified LPD-17 hull equipped with two AGSs.** Procuring a modified LPD-17 hull equipped with two AGSs has been suggested by both the Congressional Budget Office (CBO) and the Center for Strategic and Budgetary Assessments (CSBA) as a potential alternative to procuring DDG-1000s. The two guns and their magazines would be installed in the aft part of the ship, which would degrade or eliminate the LPD-17 design's well deck and aviation capabilities. CBO estimated in 2006 that an initial AGS-armed LPD-17 might cost about $1.9 billion, including $400 million detailed design and nonrecurring engineering costs, and that subsequent ships might cost about $1.5 billion each.[31]

Non-DDG-51 Options For Improved IAMD

Non-DDG-51 options for providing improved IAMD capabilities include but are not necessarily limited to the following:

- **Procuring a modified DDG-1000 design that includes additional vertical launch tubes rather than AGSs, perhaps in conjunction with procuring an adjunct non-combat radar ship.** This option would involve removing the ship's two AGSs and their magazines and using the freed-up space for additional vertical launch tubes, so as to more closely align the DDG-1000 design with the goal of providing improved IAMD capabilities. This option could significantly increase the number of vertical-launch capacity of the ship. This option could also involve procuring, as an adjunct platform, a non-combat ship equipped with a powerful radar for supporting improved missile defense operations and perhaps also improved air defense operations. This adjunct ship was discussed in the main part of this statement.

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[31] See Congressional Budget Office, *Options for the Navy's Future Fleet*, May 2006, pp. 56-57 (Box 3-1).

- **Procuring a modified DDG-1000 design that includes additional vertical launch tubes rather than AGSs, and also a higher-capability radar, perhaps in conjunction with procuring an adjunct non-combat radar ship.** This option is similar to the previous option, except that the DDG-1000 would also be equipped with a radar with more capability than the radar in the current DDG-1000 design. (The higher-capability radar would use active-array technology, like the current DDG-1000 radar, but would use that technology in a radar with more fully populated arrays.) A radar with a certain amount of additional capability could be accommodated without redesigning the DDG-1000 deck house; a radar with a greater amount of additional capability could be accommodated through a partial redesign of the deckhouse (i.e., a redesign that would affect the deckhouse but not require a change to the ship's basic hull design). Due to the space needed for the additional cooling units that would be needed to support a higher-capability radar, this option might result in a smaller number of additional vertical launch tubes than the previous option. This option, like the previous option, could also involve procuring an adjunct non-combat ship equipped with a powerful radar, particularly if the higher-capability radar on the DDG-1000 is the one that does not require redesigning the deckhouse.

- **Modifying existing CG-47s to include an improved radar.** This option would involve replacing the SPY-1 radar on existing CG-47s with an improved radar using active-array technology similar to the technology used in the current DDG-1000 radar. This option would require the removal of one of the CG-47's two 5-inch guns, as well as the removal of some other mission equipment. It would also require replacing the ship's electrical generators and cooling equipment with more capable models, and replacing the ship's electrical distribution system. This option could also involve procuring an adjunct non-combat ship equipped with a powerful radar.

Congressional Budget Office

Testimony

Statement of
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The Navy's Surface Combatant Programs

before the
Subcommittee on Seapower and Expeditionary Forces
Committee on Armed Services
U.S. House of Representatives

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CONGRESSIONAL BUDGET OFFICE
SECOND AND D STREETS, S.W.
WASHINGTON, D.C. 20515

Mr. Chairman, Congressman Bartlett, and Members of the Subcommittee, I appreciate the opportunity to appear before you today to discuss expanding and modernizing the Navy's surface combatant force. The Congressional Budget Office's (CBO's) analysis of surface combatant programs in particular, of the Navy's fiscal year 2009 shipbuilding plan in general, and of information from the Navy about its individual ship programs indicates the following:

- The total cost of the Navy's shipbuilding program through the period covered by the Department of Defense's 2009–2013 Future Years Defense Program (FYDP) would be about 30 percent higher than the Navy currently estimates.

- Building the newest generation of destroyers and cruisers—the DDG-1000 Zumwalt class guided-missile destroyer and the CG(X) future cruiser (the intended replacement for the Ticonderoga class guided-missile cruiser)—would probably cost significantly more than the Navy estimates.

- Building two DDG-51 Arleigh Burke class destroyers—the class of destroyer currently in use—per year would cost less than building one DDG-1000 per year. Procuring three DDG-51s per year would cost about 35 percent more than buying a single DDG-1000. Counting projected operating costs over a period of 35 years, the total ownership cost of five DDG-1000s would almost equal that of eight DDG-51s.

Shipbuilding Costs Under the 2009–2013 FYDP

In February 2008, the Navy released the latest version of its long-term shipbuilding plan, which describes the number, types, and projected costs of ships the Navy has stated it requires to conduct peacetime and wartime missions over the next 30 years. Like the other long-range plans the service has submitted in recent years, the 2009 plan calls for increasing the size of the existing fleet, which consists of 280 battle force ships, to 313 ships by 2020 and beyond.[1] CBO testified before this Subcommittee in March on the overall affordability of that plan and recently released a report updating its analysis.[2] In today's testimony, CBO will focus more narrowly on the five-year period encompassed by the Future Years Defense Program—2009 to 2013—and on surface combatant programs in particular.

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1. The Navy's existing fleet of battle force ships consists of aircraft carriers, submarines, surface combatant ships, amphibious warfare ships, and various support vessels. Surface combatants include destroyers, cruisers, and frigates and are designed to escort and protect other naval ships, such as aircraft carriers, as well as perform missions independently.

2. For a detailed analysis of the Navy's fiscal year 2009 shipbuilding plan through 2038, see Congressional Budget Office, *Resource Implications of the Navy's Fiscal Year 2009 Shipbuilding Plan*, letter to the Honorable Gene Taylor (June 9, 2008). Some of the estimates presented in this testimony differ slightly from those published in earlier analyses because CBO received new information or refined its method of calculating costs.

According to the budgetary information provided in the 2009 shipbuilding plan, as well as in the President's 2009 budget submission and the associated FYDP, the Navy estimates that the costs of constructing new ships of all types, refueling its nuclear-powered vessels, purchasing mission modules (combat systems) for littoral combat ships, and modernizing its large surface combatants—activities that CBO defines as "total shipbuilding"—would average about $16 billion per year (in 2009 dollars) over the period covered by the 2009–2013 FYDP. (Unless otherwise indicated, the cost figures presented in this testimony are expressed in billions of 2009 dollars of budget authority, and years denote fiscal years.) Funding would be about $14 billion in 2009 and then climb to nearly $18 billion by 2013. That amount is 25 percent greater than the $13 billion that the Navy spent, on average, for total shipbuilding each year between 2003 and 2008. According to the Navy's estimates, funding for new construction alone would average $13 billion per year between 2009 and 2013, compared with an annual average of somewhat more than $11 billion between 2003 and 2008.

CBO's estimates of the costs of the Navy's proposed shipbuilding program indicate that the funding needed over the period spanned by the 2009 FYDP would probably be higher, however. Annual costs for total shipbuilding within the FYDP would average about $21 billion, CBO estimates, which is about 30 percent more than the costs projected in the Navy's plan and about 60 percent more than the amounts the Navy has recently spent on shipbuilding. CBO estimates that the annual costs for new construction alone could average $18 billion through 2013, or about 35 percent more than the Navy projects.

The largest differences between the Navy's estimates and CBO's estimates within the FYDP are for the costs of the DDG-1000 Zumwalt class destroyer and the CG(X) future cruiser. Prior to its decision to recommend ending the DDG-1000 program at two ships, the Navy planned to buy five DDG-1000s and two CG(X)s between 2009 and 2013. (Funding for the first two DDG-1000s was authorized in 2007, and construction of those ships is expected to begin this summer.) Whereas the service put the cost of those seven ships at a total of $16.4 billion, CBO estimates the cost would be $28.5 billion. According to CBO's calculations, purchasing a total of seven DDG-1000s would have cost about 60 percent more than the Navy projected, and costs for the five ships purchased over the period covered by the 2009 FYDP would have exceeded the Navy's estimates by almost 45 percent.

In addition, CBO's estimate of the cost of the CG(X) is higher than the Navy's because of the relationship between the DDG-1000 and CG(X) programs. Currently, funding for the CG(X) within the 2009 FYDP is based on constructing the CG(X) using the hull design developed for the DDG-1000, while incorporating within that hull more-sophisticated radars and combat systems than those carried by the DDG-1000. Higher costs for the DDG-1000 would therefore mean higher costs for the two CG(X)s slated for purchase within the FYDP and for the 17 additional CG(X)s the Navy plans to purchase between 2014 and 2023. If CBO's estimate of the cost of the CG(X) is realized, the Navy may find it difficult to purchase two CG(X)s

a year between 2015 and 2021, as proposed in the 2009 shipbuilding plan. Further, if the CG(X) is nuclear powered, as directed by the National Defense Authorization Act for Fiscal Year 2008, the costs of those ships could be higher still. (The prospect for a nuclear-powered CG(X) is discussed in more detail subsequently.) If the service was able to afford only one CG(X) per year, the purchase of seven CG(X)s would have to be either canceled or delayed until the mid- to late 2020s. A delay in CG(X) purchases, rather than a cancellation, could mean that other ship purchases contained in the 2009 plan for the period beyond 2020 might have to be canceled or delayed.

Conversely, postponing the start of the CG(X) program to a point beyond the 2009–2013 FYDP would substantially reduce the pressure on the Navy's shipbuilding budget over the next few years. CBO estimates that the first two CG(X)s would cost a little more than $5 billion each. Thus, canceling the purchase of those ships in the near term would eliminate the $10 billion disparity between the Navy's and CBO's estimates for shipbuilding costs through the FYDP. However, such a shift in procurement would place increased pressure on the Navy's shipbuilding program beyond 2013.

If CBO's cost estimates for the DDG-1000 and the CG(X) are realized, it would be difficult for the Navy to build a 313-ship fleet without substantially increasing its shipbuilding budgets for the years spanning the 2009 FYDP and beyond. (CBO's cost estimates for those ships are discussed in more detail subsequently.) The gap between CBO's and the Navy's estimates of the cost of the DDG-1000 represents more than 12 percent of the Navy's total shipbuilding budget between 2009 and 2013, or about $10 billion. In the absence of additional resources, paying that difference could require canceling the purchase of either 20 littoral combat ships (LCSs) or most of the future maritime prepositioning, or MPF(F), ships within the 2009 FYDP.

DDG-1000 Guided-Missile Destroyer

The Navy had planned to buy one DDG-1000 Zumwalt class destroyer each year between 2009 and 2013, in addition to the two authorized in 2007. The service's 2009 budget suggests that the Navy expected the first two ships to cost $3.2 billion each and the next five to cost an average of $2.3 billion each—reflecting an increase of about $200 million per ship for the last five ships compared with the costs projected in the Navy's 2008 budget. CBO, by contrast, estimates that the first two DDG-1000s would cost about $5.0 billion apiece and that the next five would have cost an average of $3.6 billion each.

The Navy's cost goals and estimates for the DDG-1000 program and its predecessors, the DD(X) and DD-21, have increased several times since 1996 (see Table 1); further growth in the ship's cost is likely. The Navy's current estimate for the two lead-ship DDG-1000s prices the ship at about $250 million per thousand tons of lightship displacement (the weight of the ship minus its crew, materiel, weapons, or fuel). By contrast, the lead ship of the DDG-51 Arleigh Burke class destroyer cost about

Table 1.

Estimated Costs of the Fifth Ship of the DD-21/DD(X)/ DDG-1000 Destroyer Program, Selected Years

	Billions of 2009 Dollars
1996 Navy Cost Goals (DD-21)	
Objective Goal	1.2
Threshold Goal	1.4
2004 Future Years Defense Program	1.6
2009 Navy Estimate	2.1
2009 CBO Estimate	3.6

Sources: Department of the Navy, Fiscal Year 2009 Budget Estimates, Shipbuilding and Conversion (February 2008); Department of Defense, Future Years Defense Program for Fiscal Year 2004; and Department of the Navy, DD-21 Program Office, DD-21 Program Brief (October 19, 1998).

Notes: All years denote federal fiscal years.

For the purpose of historical comparison, the numbers exclude outfitting and postdelivery costs.

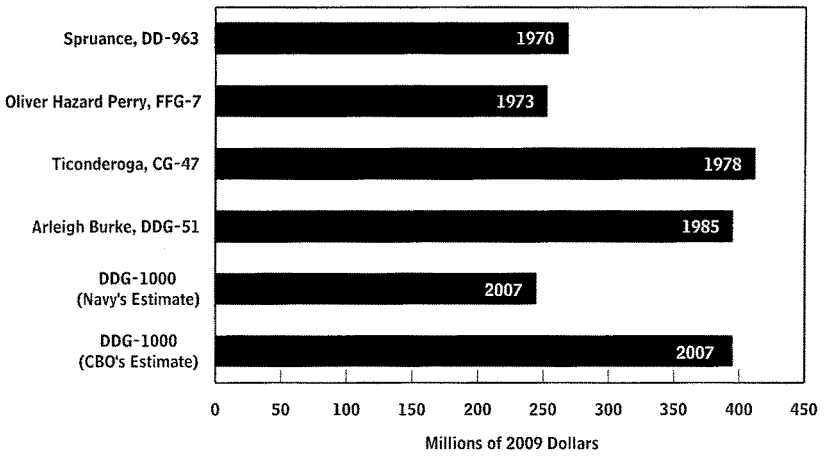
$390 million per thousand tons, and the lead ship of the Ticonderoga class cruiser cost more than $400 million per thousand tons (see Figure 1). CBO used the DDG-51 lead-ship cost as its basis for estimating the cost of the lead ship of the DDG-1000 class, adjusting for the size of the ship.

The Navy has asserted that the basis for CBO's estimate may not be valid because the DDG-51 had a number of problems in the early stages of its construction that should not be expected to occur during the construction of the first DDG-1000s. Specifically, the design of the lead DDG-51 was disrupted and delayed because a new design tool being used at the time was incomplete and not well understood. It had to be abandoned and the design restarted using more traditional methods. The design of the lead DDG-51 was thus about 20 percent complete when construction began. By contrast, according to the Navy, the design of the DDG-1000 progressed far more smoothly; the Navy expects to have the design 85 percent complete when construction begins this summer. In addition, because the DDG-51 is a smaller, more compact ship, the Navy believes that, on a ton-for-ton basis, it has been more difficult to build than the DDG-1000 class is designed to be. (The more open internal spaces of the DDG-1000 mean that it would not be as difficult to install piping, wiring, and other components, and, thus, on a ton-for-ton basis, it should be less time-consuming, and therefore less expensive, to build than a DDG-51.)

Although the Navy may not encounter the same problems constructing the lead DDG-1000s that it did when constructing the lead DDG-51, CBO expects that the service will encounter other problems that will increase the costs of the DDG-1000 and delay its construction. As Navy officials have stated, lead ships are often very difficult to build, and many problems typically occur during construction. Problems

Figure 1.

Cost per Thousand Tons for the Lead Ship of Various Classes of Surface Combatants



Source: Congressional Budget Office based on data from the Department of the Navy.

Notes: The years shown here indicate the year in which each lead ship was authorized.

Costs are per thousand tons of lightship displacement (the weight of the ship minus its crew, materiel, weapons, or fuel).

with the first littoral combat ships (for which costs doubled) and with the lead ship of the LPD-17 class amphibious transport dock (for which costs increased by 80 percent and construction time more than doubled) illustrate the difficulties the Navy has encountered recently in constructing lead ships.[3] Both the LCS and the LPD-17 are much less complex technologically than the DDG-1000 will be. In addition, while the designs of the littoral combat ships and DDG-51 were 20 percent to 30 percent complete at the start of fabrication, the design of the LPD-17 was about 80 percent complete at the start of fabrication—and it was arguably the Navy's most troubled lead-ship program over the past 20 years. Experience with the Virginia class submarine program raises similar concerns. Recently, Navy officials stated in testimony before the Congress that, when construction of those new submarines began, the Virginia class program was at about the same point in its design that the DDG-1000 will be. The cost of the first two ships of the Virginia class exceeded their budget by an average of 17 percent.

3. Problems with the LCS included a change in construction standards, other design changes, and mistakes made by the contractor. The LPD-17 had suffered from an incomplete design before construction began, difficult integration of new technologies on the ship, and higher than expected labor and material costs.

Moreover, the DDG-1000 program is incorporating 10 major new technologies in the lead ship of the class that are intended to improve on technologies used in the previous-generation DDG-51 destroyer. Those technologies include electric drive and a distributed power system, a tumblehome hull (one in which the sides of the ship slope outward to increase stealthiness), an advanced gun system, new radars, and composite materials and stealth-enhancing coatings for the deckhouse. In the past, the Navy typically introduced three or four major new technologies into a new class of surface combatant.

A comparison of the Navy's estimate for two additional DDG-51s and its estimate for the seventh DDG-1000, which was slated to be purchased in 2013, illustrates the risk for cost growth in the latter program. In information recently provided to the Chairman of the Subcommittee on Seapower of the Senate Armed Services Committee, the Navy stated that if the Congress authorized the purchase of two new DDG-51s in 2009—ships that would benefit from lessons learned during the construction of 62 similar ships—the cost would be about $3.3 billion, or slightly less than $1.7 billion each. At the same time, in its fiscal year 2009 budget submission to the Congress, the Navy stated that the cost to build the seventh DDG-1000 in 2013 would be about $2.4 billion in 2013 dollars. Deflating the cost of the seventh DDG-1000 using the inflation index for shipbuilding that the Navy provided to CBO brings the Navy's estimate for that ship to about $1.9 billion (excluding outfitting and postdelivery costs). The lightship displacement of the DDG-1000 is about 5,000 tons (or more than 50 percent) greater than that of the DDG-51s being constructed today. In effect, the Navy's estimates imply that those 5,000 extra tons, as well as the 10 new technologies being incorporated in the DDG-1000 class, will increase the ship's cost by only $200 million, or about 10 percent.[4]

If CBO's cost estimates for the lead DDG-1000s are realized—CBO's estimate is about 55 percent higher than the Navy's for the cost of procuring the first two DDG-1000s—the lead ships of the DDG-1000 program would still experience lower cost growth than the Navy's other lead-ship programs did over the past 20 years. According to an analysis conducted in 2006 by the Department of Defense's Cost Analysis Improvement Group, commonly known as the CAIG, five of eight lead-ship programs experienced cost growth of over 60 percent. The CAIG's analysis at the time did not include the Virginia class submarine program, the first two ships of which experienced cost growth of 11 percent and 25 percent. (Those ships were built under a teaming arrangement and assembled in two different shipyards). The analysis also did not include the first two littoral combat ships, which have experienced cost growth of about 100 percent.

4. The Navy's estimate for the seventh DDG-1000 benefits from the assumption in the FYDP that a CG(X) would also be purchased in 2013, spreading the fixed overhead costs at the shipyards over two ships. If one compares the costs of the sixth DDG-1000, which was slated to be purchased in 2012, with the Navy's estimate of the cost to buy one DDG-51—$2.3 billion versus $2.2 billion—the Navy's estimate assumes those new technologies and the 5,000 additional tons are virtually free.

Table 2.

Projected Costs of Constructing DDG-1000 and DDG-51 Destroyers, 2009 to 2013

(Billions of 2009 dollars)

	2009	2010	2011	2012	2013	Total
DDG-1000 Zumwalt Class (One per year)[a]	3.7	3.8	3.6	3.7	3.6	18.5
DDG-51 Arleigh Burke Class						
One per year starting in 2010	0.4 [b]	2.2	2.3	2.3	2.4	9.6
Two per year starting in 2010	0.4 [b]	3.7	3.8	3.9	3.9	15.7
Three per year starting in 2010	0.4 [b]	5.1	5.2	5.3	5.4	21.4
Memorandum:						
DDG-1000 (Navy's Estimate)	2.5	2.5	2.2	2.3	2.0	11.4

Source: Congressional Budget Office.

Notes: All figures include outfitting and postdelivery costs.

The Navy has announced that it will recommend ending the DDG-1000 program at two ships and resume building DDG-51s in 2010.

a. Figures exclude amounts needed to pay for potential cost overruns on the first two DDG-1000s.

b. Figure represents an assumption about the costs of restarting the production of DDG-51s.

The Cost of Restarting the DDG-51 Program

The Subcommittee specifically asked CBO to examine the costs of canceling the DDG-1000 program and restarting production of DDG-51 destroyers. The Congress authorized funding for what were to be the last DDG-51s in 2005; out of a total program of 62 DDG-51s, nine remain under construction. CBO does not have sufficient information available to determine how much it would cost to restart production of DDG-51s, above extrapolating from the costs of the ships themselves. The authorization bill passed by the House (H.R. 5658) on May 22 allocated $400 million in advance procurement that was to be applied either to the purchase of a third DDG-1000 or to restarting the production of DDG-51s. In the absence of other information, CBO used that figure as an approximation of the amount needed to reestablish production lines for parts and components that were used to build DDG-51s and may no longer be available. Under that assumption and using estimates for DDG-51 production costs that the Navy provided to the Seapower Subcommittee this year, buying eight DDG-51s—two per year between 2010 and 2013—would cost a total of $15.7 billion. Building five DDG-1000s between 2009 and 2013 would cost $18.5 billion, CBO estimates. Twelve DDG-51s, or three per year between 2010 and 2013, would cost about $21.4 billion (see Table 2).

Table 3.

Total Projected Ownership Costs of DDG-1000 and DDG-51 Destroyers Over a Service Life of 35 Years

Program	Billions of 2009 Dollars
DDG-1000 Zumwalt Class	
Single Ship	3.9
5-Ship Purchase	19.4
DDG-51 Arleigh Burke Class	
Single Ship[a]	2.4
8-Ship Purchase	19.2
12-Ship Purchase	26.8
Memorandum:	
Navy's Estimate for DDG-1000	
Single Ship	2.6
5-Ship Purchase	13.2

Source: Congressional Budget Office.

Note: Total ownership costs include construction costs, operating costs, and outfitting and post-delivery costs.

a. The total ownership cost of the single ship assumes that it is part of an annual two-ship purchase. Total ownership costs for ships purchased at rates of one per year and three per year would be $2.8 billion and $2.2 billion, respectively.

Total Ownership Costs of DDG-1000 and DDG-51 Destroyers

In the information provided to the Seapower Subcommittee regarding DDG-51 costs, the Navy indicated that the costs to operate a DDG-51 destroyer and a DDG-1000 destroyer would be fairly comparable. Specifically, the Navy stated that the total operating costs of a DDG-51 would be about $41 million per year, or about 10 percent more than the DDG-1000's $37 million annual operating costs. That difference is much smaller than the Navy had previously estimated. In 2005, the Navy asserted that operating a DDG-51 would cost about 28 percent more than operating a DDG-1000. In comparison, CBO testified in 2005 before this Subcommittee that operating costs for the DDG-51 would probably be about 6 percent more than those for a DDG-1000.

Using data culled from two sources—the Navy's recent estimates of the costs to operate the two types of destroyer, and CBO's estimates of the costs to purchase additional DDG-51s and DDG-1000s—CBO expects that the total ownership cost of a DDG-51 would be about 60 percent of the cost of a DDG-1000. Over the course of a 35-year service life, the costs to buy and operate a DDG-51 would be $2.4 billion on a discounted (net-present-value) basis. In comparison, using the average expected

procurement cost for the five DDG-1000s the Navy expects to buy between 2009 and 2013, the total cost to build and operate a DDG-1000 destroyer would be about $3.9 billion.[5] Thus, the costs to buy and operate five additional DDG-1000s would total $19.4 billion over 35 years. In comparison, the costs to buy and operate more DDG-51 destroyers over a period of 35 years would be about $19.2 billion for eight ships and $26.8 billion for 12 ships (see Table 3).

CG(X) Future Cruiser

In its 2009 budget submission, the Navy proposed to begin buying a new type of missile defense surface combatant, the CG(X) cruiser, in 2011. CBO's estimates of the costs of procuring the first two ships in that class are about double the Navy's estimates. CBO assumed that the CG(X) would use the same hull design and be the same weight as the DDG-1000. The Navy's budget estimates for the cruisers slated for purchase in 2011 and 2013 are based on similar assumptions; the service expects those ships to cost $2.8 billion and $2.5 billion, respectively. Last year, the Navy conducted an Analysis of Alternatives (AoA) to determine what capabilities the CG(X) should have. Results of that analysis have not yet been released, but a version of the CG(X) built using the DDG-1000 hull is only one of the options considered in the AoA. The Navy says that it is studying other options that would be larger and more capable than a CG(X) built using the DDG-1000 hull, including ships that would use nuclear propulsion (see Box 1). It appears now, moreover, that the Navy will not purchase the CG(X) in 2011 but delay the ship to 2015 or beyond.

The Navy does not appear to be considering a ship smaller than the DDG-1000 as the basis for the CG(X). If the DDG-1000 program is canceled after two ships, it appears unlikely the Navy will use that hull form for a future cruiser. Any design that is larger is likely to be substantially more expensive than the DDG-1000. Using the DDG-51 as an analogy, CBO estimates that the lead CG(X) would cost $5.2 billion, about the same as the lead DDG-1000. The average cost of each ship in that class would be about $4.2 billion, assuming that the CG(X) was conventionally powered and used the DDG-1000 hull. CBO also assumed that, consistent with the DDG-1000 program, two shipyards would build the CG(X)s.

CBO's estimate for the cost of the CG(X) may be optimistic. The last time the Navy reused a hull design for a new class of surface combatants was in the 1970s, when the service built the Spruance class destroyers and Ticonderoga class cruisers. Both ship classes shared the same hull design but were intended for different missions. The Spruances were general-purpose destroyers used to escort other Navy ships in the event of war and were designed in particular for antisubmarine warfare. The

5. Using the Navy's cost estimates for the DDG-1000 also shows a higher total ownership cost for the DDG-1000—about $2.6 billion over a 35-year service life.

Box 1.

A Nuclear-Powered Cruiser

The National Defense Authorization Act for Fiscal Year 2008 directed that future Navy aircraft carriers, submarines, and cruisers should be nuclear powered. Building a future nuclear cruiser, a CGN(X), would probably cost more than the Congressional Budget Office (or the Navy) has currently estimated for a conventionally powered CG(X). A Navy report on the cost-effectiveness of nuclear propulsion estimates that the additional cost to install that capability in a conventionally powered surface combatant would be approximately $700 million. If a CGN(X) had to be much larger than the DDG-1000 or a conventionally powered CG(X), there would be additional costs. Press reports have indicated that a CGN(X) could displace as much as 23,000 to 25,000 tons, or 60 percent to 70 percent more than the DDG-1000. A large ship might be necessary, for example, if the Navy were to use for the CGN(X) one of the reactors now used in the CVN-78 class of aircraft carrier; according to the Navy, that reactor's size, weight, and supporting systems could not be accommodated within a hull the size of the DDG-1000's. If that proved to be the case, the larger, nuclear-powered CGN(X) could cost much more than the DDG-1000.

Ticonderoga class cruisers incorporated the Aegis antiair combat system, the SPY-1 radar, and surface-to-air missiles to counter the threat to Navy carrier battle groups posed by Soviet naval aviation. Reflecting its more complex combat systems, the lead Ticonderoga's cost per thousand tons was more than 60 percent higher than that of the lead Spruance, their many common hull features and mechanical systems notwithstanding.

Modernizing DDG-51 Destroyers

The 40-year service life assumed for the DDG-51 Arleigh Burke class destroyers in the Navy's 2009 shipbuilding plan is a significant change from the 35-year service life assumed in the 2007 and 2008 shipbuilding plans. Historical evidence suggests that the Navy's assumption that those destroyers can serve effectively for 40 years may be optimistic. The average retirement age of the last 18 classes of cruisers, destroyers, and frigates was below 35 years, and many were retired at 25 years or less (see Table 4). When the DDG-51 class was first built, it was designed to have a service life of 30 years.

Generally, the Navy has considered surface combatants to be obsolete when their installed combat systems are deemed no longer effective to counter the threats they would face in the event of war. The hull and mechanical systems of the ships have

Table 4.

Average Retirement Age of Surface Combatant Classes

(Billions of 2009 dollars)

Ship Class	Average Retirement Age (Years)	Reason(s) for Retirement
CG-47 (Non-VLS)	20	Budgetary; not as capable as other ships
CG-26	28	Budgetary
CG-16	30	Budgetary
CGN-38	17	Budgetary
CGN-36	24	Budgetary
CGN-35	27	Budgetary
CGN-9	32	Budgetary
DD-963 (VLS)	25	Budgetary; not as capable as other ships
DD-963	25	Budgetary; not as capable as other ships
DD-931	29	End of service life
DDG-993 (Non-VLS)	17	Budgetary; not as capable as other ships
DDG-37	30	End of service life
DDG-2	26	End of service life
FF-1052	17	End of service life; limited capability
FF-1040	22	End of service life; limited capability
FF-1037	25	End of service life; limited capability
FFG-7	18	Budgetary; end of service life
FFG-1	21	End of service life

Source: Congressional Budget Office based on data from the Department of the Navy.

Note: The reasons cited for retirement are the Navy's descriptions.

a. CG = guided-missile cruiser; VLS = vertical launch system; CGN = nuclear-powered guided-missile cruiser; DD = destroyer; DDG = guided-missile destroyer; FF = frigate; FFG = guided-missile frigate.

usually had some remaining service life, even if additional resources would have been required to keep them in good working order. Currently, the Navy is planning a modernization program that will focus mostly on the DDG-51's hull and mechanical systems, at an average projected cost of about $100 million per ship. On the basis of historical experience, CBO expects that the combat systems of the DDG-51s may have to be upgraded twice in order for those ships to serve in the fleet for 40 years. In comparison, the Navy plans to spend more than $200 million per ship on modernizing the Navy's remaining CG-47 Ticonderoga class cruisers, including their combat systems, so that those ships can serve effectively for at least 35 years. CBO estimates that the per-ship cost of one round of DDG-51 modernizations, including upgrades to the combat systems, would be at least comparable to the costs projected for modernizing the CG-47s, or more than $200 million apiece.

Littoral Combat Ship

The Navy's 2009 shipbuilding plan envisions building 55 littoral combat ships between 2005 and 2019. Because those ships are assumed to have a service life of 25 years, the Navy would need to begin procuring their replacements in 2032. The LCS differs from the Navy's existing and previous warships in that the program is divided into two components: the sea frame (the ship itself) and mission modules (combat systems). The LCS is designed modularly so that it can be reconfigured fairly quickly to perform one of three distinct missions: finding and sinking quiet diesel submarines operating in crowded, noisy, and shallow coastal waters; finding and neutralizing mines; and countering swarm attacks by small, high-speed boats armed with missiles. The Navy expects to buy 64 mission modules for the 55-ship program.

The Navy intends for the LCS to be a relatively affordable ship that will be fairly simple to design and build. Originally, each sea frame was expected to cost about $260 million (in 2009 dollars, or $220 million in 2005 dollars). The Navy's 2009 budget would allow the purchase of 18 LCSs during the 2009–2013 period, at an average cost of about $450 million per sea frame. That is 11 fewer than the 2008 plan envisioned for the same time period. In the summer of 2007, the Navy requested that the cost cap for the fifth and sixth LCSs be raised to $460 million. Based on the effects of a higher production rate and experience gained between the construction of the first and subsequent ships, that figure suggested that the total construction cost of the first ships would be about $600 million each. In the 2009 budget, the Navy estimates the cost of LCS-1 at $631 million and LCS-2 at $636 million. In recent testimony, the Navy indicated that the costs of LCS-2 will probably grow further but did not indicate by how much.

Historical experience indicates that cost growth in the LCS program was 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 million in 2009 dollars (or $220 million in 2005 dollars) was optimistic. The first FFG-7 cost about $670 million to build (in 2009 dollars), 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.

On the basis of the actual costs that 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 costs and various nonrecurring costs associated with the first ships of a class but excluding mission modules. As of April 27, 2008, LCS-1 was 87 percent complete and LCS-2 was 72 percent complete. So, 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, the average cost per ship 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.

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).

United States Government Accountability Office

GAO

Testimony

Before the Subcommittee on Seapower and Expeditionary Forces, Committee on Armed Services, House of Representatives

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DEFENSE ACQUISITIONS

Zumwalt-Class Destroyer Program Emblematic of Challenges Facing Navy Shipbuilding

Statement of Paul L. Francis, Director
Acquisition and Sourcing Management

GAO-08-1061T

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Highlights

Highlights of GAO-08-1061T, a testimony before the Subcommittee on Seapower and Expeditionary Forces, Committee on Armed Services, House of Representatives

Why GAO Did This Study

The U.S. Navy is about to begin construction of the first Zumwalt-class destroyer (DDG 1000) amid considerable uncertainties and a high likelihood of cost and schedule growth. Significant cost growth and schedule delays are persistent problems that continue to compromise the Navy's shipbuilding goals. This testimony focuses on (1) the challenges faced by the DDG 1000 program and (2) the strain such challenges portend for long term shipbuilding plans.

What GAO Recommends

While GAO is making no new recommendations in this testimony, GAO has made numerous recommendations through the years to improve business cases for Navy acquisitions as well as other Department of Defense weapon acquisitions. The Department's acquisition policies largely incorporate these recommendations, but program execution has fallen short.

To view the full product, including the scope and methodology, click on GAO-08-1061T. For more information, contact Paul Francis at (202) 512-4841 or francisp@gao.gov.

July 31, 2008

DEFENSE ACQUISITIONS

Zumwalt-Class Destroyer Program Emblematic of Challenges Facing Navy Shipbuilding

What GAO Found

From the outset, DDG 1000 has faced a steep challenge framed by technical sophistication, demanding mission requirements, and a cost and schedule budget with little margin for error. The Navy has worked hard to manage the program within these competing goals. Yet recently, the Navy has discussed canceling construction of the remaining five DDG 1000 ships. Although a cancellation may stem from fiscal necessity, it reflects poorly on the acquisition, requirements, and funding processes that produced the DDG 1000 business case. Future success in shipbuilding depends on understanding why the weaknesses in the DDG 1000 business case, which now seem to threaten the program, did not prompt a similar re-examination several years ago.

The current program of record faces significant execution risks. The Navy will be pressed to complete a large amount of design work in time for the start of construction in October 2008. Demonstration of key components—particularly, the deckhouse, the volume search radar, and the integrated power system—have fallen behind. Despite restructuring the construction schedule, margins between several major events are gone. For example, land-based tests of the integrated power system are now scheduled after installation on the lead ships. Software development has also proven challenging; the Navy certified the most recent software release before it met about half of its requirements. Further, the full costs of constructing the two lead ships have not been entirely recognized or funded. The complexity and unique features of DDG 1000, along with the design work, testing, and actual construction experience to come, make cost growth beyond budgeted amounts likely.

The challenges confronted by DDG 1000 are not unique. Across the shipbuilding portfolio, executing programs within cost and schedule estimates remains problematic, largely because of unexecutable business cases that allow programs to start with a mismatch between scope and resources. Collectively, problems in individual programs erode the buying power of the Navy's long-range construction budget. The Navy compensates for near-term construction deferrals by increasing construction in the out-years, but this will require significant funding increases in the future, which are unlikely. Near-term tradeoffs could have long-term consequences for maintaining a rational balance between mission capability, presence, industrial base, and manning.

The Navy's consideration of cutting the DDG 1000 program back comes after over 10 years of development and $13 billion have been invested. Clearly, changes are needed in how programs are conceptualized and approved. Although the elements needed for success are well known, unrealistic compromises are made to make business cases conform to competing demands. An examination of the root causes of unexecutable business cases must be done or shipbuilding programs will continue to produce unsatisfactory outcomes. This examination must begin with an honest appraisal of the competing demands made on new programs early in the acquisition process and how to strike a better balance between them.

Mr. Chairman and Members of the Subcommittee,

I am pleased to be here today to discuss the Department of the Navy's Zumwalt-class (DDG 1000) destroyer program, part of the family of future surface combatants. Much of my statement is drawn from a detailed report we issued today on the status of the program.[1] DDG 1000 is an ambitious program that is now in the first year of a 6-year construction schedule for the two lead ships. Last week, the Navy began discussing cancellation of the remaining five ships in the class. While a cancellation may stem from fiscal necessity, it comes after well over 10 years of development and over $13 billion in investments thus far. Future success in shipbuilding programs depends on recognizing the factors that necessitated the decision and taking steps to avoid having to do so again in the future.

Accordingly, today I will be discussing (1) the challenges faced by the DDG 1000 program and (2) the strain such challenges portend for the shipbuilding budget. I do this not as a critique of the Navy's management of the program (for there is much about the acquisition that exhibits foresight and thoughtful planning), but as the latest in a series of shipbuilding programs in which the scope of the program is a mismatch for the time and money resources that have been allotted for it. These mismatches result in reductions in quantities that, in turn, have a collective effect on the Navy's long-term shipbuilding goals. I look forward to today's hearing as an opportunity to discuss not only the symptoms of the problem, but the root causes as well.

Summary

DDG 1000 development has been framed by challenging multimission requirements, resultant numerous new technologies, and a cost and schedule budget that added to—rather than eased—the challenge. While the Navy has done much work to try to manage the program within these competing goals, it will begin lead ship construction in October 2008 with significant uncertainties, particularly in developing the ship's design, key components, and the ship software system. Recent restructuring of the schedule buys more time for technology development, but shifts key efforts like installation and testing of the combat systems until later in the construction schedule—after the ships have been initially delivered. Such compromises—made before construction has even begun—suggest that

[1]See GAO, *Defense Acquisitions: Cost to Deliver Zumwalt-Class Destroyers Likely to Exceed Budget*, GAO-08-804 (Washington, D.C.: July 31, 2008).

the Navy already has little margin for solving future problems without adding money and time. In fact, it appears that the budget for the lead ships is not adequate to deliver fully operational ships. The complexity and unique features of DDG 1000, along with the design work, testing, and actual construction experience to come, add to the risk of cost growth.

DDG 1000 is not unique in this respect. Across the shipbuilding portfolio, the Navy has had problems executing its programs within cost and schedule estimates, particularly with first-in-class ships. I see this as a mismatch between the scope of programs and the resources (time and money) allotted to execute them. For example, albeit a much simpler vessel, the Littoral Combat Ship (LCS) program proceeded into construction with unstable designs and unrealistic cost and schedule estimates. Similarly, the Navy is proceeding with construction of the Ford-class (CVN 78) aircraft carrier as it faces problems with an enabling technology and a budget that has no margin for unanticipated problems. Cost and schedule problems in individual programs have a collective effect on the Navy's long-range construction plans. Each year, the Navy prepares a 30-year shipbuilding plan that attempts to balance the competing objectives of maximizing the mission capabilities of each ship and reducing crew size, while at the same time providing a sufficient quantity of ships to achieve the necessary level of global presence and to provide a stable workload for shipyards. This year, the Navy has reduced the plan's ship quantities in the near term and compensated for current shipbuilding problems by projecting increased ship construction in the out-years based on the hope that more money will be available in the future. The Navy's proposed decision to discontinue the DDG 1000 program after the two lead ships and build more of the less costly Arleigh Burke-class (DDG 51) destroyers should restore some balance in the plan. However, we would do well to understand the factors that led to the DDG 1000 business case so that future programs do not suffer the same fate.

This statement is based on work we conducted between September 2007 and July 2008, as well as our previous testimonies and reports and is in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Navy Unlikely to Execute DDG 1000 Program within Current Cost and Schedule Estimates

The DDG 1000 program has from the onset faced a steep challenge framed by demanding mission requirements, stealth characteristics, and a desire to reduce manning levels by more than half that of predecessor destroyers. These requirements translated into significant technical and design challenges. Rather than introducing three or four new technologies (as is the case on previous surface combatants), DDG 1000 plans to use a revolutionary hull form and employ 11 cutting-edge technologies, including an array of weapons, highly capable sensors integrated into the sides of a deckhouse made primarily of composite material—not steel, and a power system designed for advanced propulsion as well as high-powered combat systems and ship service loads. This level of sophistication has necessitated a large software development effort—14 million to 16 million lines of code. All of this is to be accomplished while splitting construction between two shipyards. The Navy believes this approach and schedule is important to managing shipyard workloads, as starting later would have caused shipyard workload to drop too low. In a sense, then, the construction approach and schedule became an additional challenge as they became constraints on the pace of technology and design development. To meet these multiple and somewhat conflicting demands, the Navy structured its acquisition strategy to develop key systems and mature the design before starting to build the ship. While the Navy has made good decisions along the way to address risk, it is already likely, shortly before the Navy embarks on ship construction, that additional funding will be necessary or trade-offs will need to be made to develop and deliver DDG 1000 ships.

Despite a Thoughtful Approach, Delays in Technology, Software, and Design Development Pose a Risk to Successful Program Execution

Despite multiple and somewhat competing demands, the Navy conceived a thoughtful approach and achieved developmental successes on DDG 1000. Developing 10 prototypes of the ship's critical systems helped to create confidence that a number of technologies would operate as intended, and the Navy's plan to mature the ship's design before starting construction aims to reduce the risk of costly design changes after steel has been cut and bulkheads built. For example, the Navy successfully demonstrated the advanced gun system through initial guided flight and testing on land. In other cases, such as for the integrated power system, tests brought to light technical problems, which the Navy was able to address by going to an alternate technology. However, notwithstanding these efforts, significant challenges remain in developing the ship's design and a number of key components—in particular, the deckhouse, volume search radar, and the integrated power system. Moreover, the ship's capability is contingent on an unprecedented software development effort. Recently, the Navy restructured the schedule to buy more time for development—a good

decision. However, as construction of the first ship has not yet begun, the Navy may have exhausted its options for solving future problems without adding money and time.

Although the initial phases of the design are complete, the shipbuilders will be pressed to complete a large amount of design work by October 2008 when lead ship construction begins. From August 2007 through May 2008, the shipbuilders finished work on 16 of the 100 design zones (individual units that make up the ship's design) leaving 5 months to finish the final design phases in 84 zones leading up to the start of construction. While the shipbuilders believe they can finish the design by the start of ship construction, delays in the development of the ship's key systems could impede completion of the design and eventually interfere with DDG 1000 construction. If the shipbuilders cannot finish planned design work prior to the start of lead-ship construction, the program is at greater risk for costly rework and out-of-sequence work during construction.

To maintain the start of ship construction in 2008 while continuing to develop the ship's technologies, the Navy recently realigned the program's schedule. Rather than delivering a fully mission-capable ship, the Navy will take ownership of just the vessel and its mechanical and electrical systems—including the ship's power system—in April 2013. At that point, the Navy plans to have completed "light-off" of the power, mechanical, and electrical systems. Light-off refers to activating and testing these systems aboard ship. The Navy deferred light-off of the combat systems—which include the radars, guns, and the missile launch systems—by over 2 years until May 2013. According to the Navy, conducting light-off in phases allows the program to test and verify the ship's major systems, in particular the integrated power system, in isolation and creates additional time to mature the combat systems, as well as the software that supports these systems, before ship installation and shipboard testing. However, since the Navy will only test and inspect the hull prior to taking ownership of the vessel, it will not have a full understanding of how the ship operates as a complete and integrated system until after final shipboard testing of the combat systems in 2014.

While the restructure maintains the construction schedule, it does delay verifying the performance of the integrated power system before producing and installing it on the ship. Tests of a complete integrated power system with the control system will not occur until 2011—nearly 3 years later than planned. To meet the shipyard's schedule, the Navy will buy a power system intended for the third ship and use it in land-based tests. As a result, the integrated power system will not be demonstrated

until a year after the power systems have been produced and installed on the two lead ships—an approach that increases exposure to cost and schedule risk in production.

Finalizing deckhouse manufacturing and assembly processes are essential to constructing and delivering the deckhouse as planned. Changes to the manufacturing processes for deckhouse production are ongoing. The shipbuilder is validating process changes through production and inspection of a series of test units, culminating with a large-scale prototype manufactured to the same thickness and other specifications of the deckhouse. Final validation of the manufacturing processes for deckhouse construction will not occur until after construction, inspection, and shock testing of the large-scale prototype. However, test and inspection activities are not scheduled for completion until after the deckhouse production readiness review in September 2008. Problems discovered during testing and inspection may require additional changes to manufacturing methods. Moreover, facility and machinery upgrades necessary to construct and assemble the deckhouse are not all scheduled to be complete until March 2010—over a year after the start of construction of the first deckhouse. While the shipbuilder expects to complete efforts to meet the construction schedule, if difficulties occur, the deckhouses may not be delivered to the shipyards on time, disrupting the construction sequence of the ships.

Further, the volume search radar (one of two radars in the dual band radar system) will not be installed during deckhouse construction as initially planned. Instead, installation will occur at the shipyard when the first ship is already afloat, a more costly approach. The change was partly due to delays in developing the volume search radar. Land-based demonstrations of the volume search radar prototype originally planned to be done before starting ship construction will not be completed until 2009—almost 2 years later. Development difficulties center on the radar's radome and transmit-receive units. The contractor has been unable to successfully manufacture the radome (a composite shield of exceptional size and complexity), and the transmit-receive units (the radar's individual radiating elements) have experienced failures operating at the voltage needed to meet range requirements. While the Navy believes that the voltage problem has been resolved, upcoming land-based tests will be conducted at a lower voltage—and without the radome. The Navy will not demonstrate a fully capable radar at its required power output until after testing of the first production unit sometime before combat systems light-off in 2013.

Crucial to realizing DDG 1000's required manning reductions is the ability to achieve a high degree of computer automation. If the ship's software

does not work as intended, crew size would need to be increased to make up for any lack of automation. Given the risks associated with the ship's software system, referred to as the total ship computing environment, the Navy initially planned to develop and demonstrate all software functionality (phased over six releases and one spiral) over 1 year before ship light-off. As a result of changes in the software development schedule, the Navy eliminated this margin. Until recently, the Navy was able to keep pace with its development schedule, successfully completing the first three software releases. However, the Navy is now entering the complex phases of software development when ship functionality is introduced. The Navy certified release 4 without the release meeting about half of the software system requirements, mainly because of issues coding the ship's command and control component—the heart of the ship's decision-making suite. Problems discovered in this release, coupled with the deferred work, may signify larger software issues that could disrupt the development of releases 5 and 6 and prevent the timely delivery of software to meet the ship's schedule.

DDG 1000 Costs Likely to Exceed Budget

Costs of the DDG 1000 ships are likely to exceed current budgets. If costs grow during lead ship construction due to technology, design, and construction risks, as experience shows is likely, remaining funds may not be sufficient to buy key components and pay for other work not yet under contract.

Despite a significant investment in the lead ships, the remaining budget is likely insufficient to pay for all the effort necessary to make the ships operational. The Navy estimates a total shipbuilding budget of $6.3 billion for the lead ships. Of this amount, the Navy has approximately $363 million remaining in unobligated funds to cover its outstanding costs and to manage any cost growth for the two lead ships,[3] but known obligations for the lead ships, assuming no cost growth during construction, range from $349 million to $852 million (see table 1).

[3]Based on data as of June 2008.

Table 1: Unfunded Lead Ship Expenses

Expense	Status	Estimated value
Deferred ship construction scope	Work removed from scope of construction contract to stay within construction budget. Since this work is necessary to meet ship specifications, the Navy plans to perform and fund work sometime after the lead ships are delivered. Includes the following: • windows and enclosures for certain sensors, • special hull treatment, • deck coverings that comply with the ship's radar cross section requirements, • secondary hull sheathing, • anchor handling system.	$85 million
Contract price adjustments	Construction contracts structured to allow price adjustments based on future events that were considered largely outside of the shipbuilders' control. Adjustments reduced the shipbuilders' risk premium allowing a lower initial contract price. Includes the following: • shifts in future workload, • escalations in future rates, • changes in the price of raw materials such as steel and copper.	Not available
Deferred procurement of select combat systems	Purchase and installation are not yet under contract for the following systems: • volume search radar aperture and other components • vertical launch system electronics, cell adapters, uptakes, and junction boxes • 34 external communications antennas and apertures per ship. The contractor estimate of these costs is approximately $763 million; the Navy estimates approximately $200 million for both ships.	$264 million to $767 million
Deferred activation of combat systems	Funds also not obligated toward light-off and final shipboard testing of the combat systems. The Navy estimates as much as $64 million for both ships, including about $4 million in costs for activation to be provided to the shipbuilders. Contractor and shipbuilder estimates may be higher.	

Source: GAO analysis of Navy and contractor data.

The main discrepancy is the current estimated cost of the combat systems. In order to create a cash reserve to pay for any cost increases that may occur during construction of the lead ships, the Navy has deferred contracting and funding work associated with conducting shipboard testing of the combat systems—and in some cases has also delayed purchasing and installing essential ship systems until later in the construction sequence. The Navy has estimated the cost of these combat systems to be around $200 million, while the contractor's estimate is over

$760 million. If the agreed-on cost approaches the contractor's estimate, the Navy will not have enough in its remaining funds to cover the cost.[3]

There is little margin in the budget to pay for any unknown cost. To ensure that there was enough funding available in the budget to cover the costs of building the lead ships, the Navy negotiated contracts with the shipbuilders that shifted costs or removed planned work from the scope of lead ship construction and reduced the risk contingency in the shipbuilders' initial proposals. For example, the Navy stated that it shifted in excess of $100 million associated with fabrication of the peripheral vertical launch system from the scope of ship construction and funded this work separately using research and development funding.[4] As a result, this work is no longer included in the $6.3 billion end cost to construct DDG 1000.

To the extent that the lead ships experience cost growth beyond what is already known, more funding will be needed to produce operational ships. However, these problems will not surface until well after the shipyards have begun construction of the lead ships. Cost growth during construction for lead ships has historically been about 27 percent, and an independent estimate by the Department of Defense already projects the cost of the two lead ships to be $878 million higher than the Navy's budget. With ships as expensive as DDG 1000, even a small percentage of cost growth could lead to the need for hundreds of millions of dollars in additional funding.

[3]According to Navy officials, the Navy expects to definitize the contract for combat systems procurement in August 2008.

[4]By shifting these costs the Navy stated that it could use research, development, testing, and evaluation (RDT&E) funding instead of procurement funding (SCN). However, this may lead to increases in the RDT&E budget.

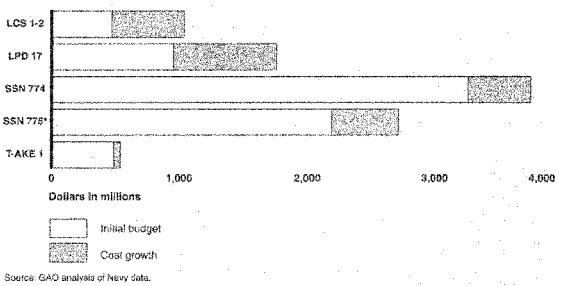
Program Execution Challenges Have Required the Navy to Make Trade-Offs In Its Long-Range Shipbuilding Goals

The challenges facing DDG 1000 are not unique among Navy shipbuilding programs nor to Department of Defense acquisition programs at large. Across the shipbuilding portfolio, the Navy has not been able to execute programs within cost and schedule estimates, which has, in turn, led to disruptions in its long-range construction plans. This outcome has largely resulted from Navy decisions to move ships forward into construction with considerable uncertainties—like immature technologies and unstable designs. However, by doing so the Navy has effectively eroded its buying power by forcing it to make near-term quantity reductions within its shipbuilding plan. Because fleet requirements remain steady at 313 ships, the Navy must compensate for near term construction deferrals by increasing ship construction in the out-years. Achieving this plan, however, will require significant funding increases in the future, which will likely be difficult to obtain. These near term trade-offs could have long-term consequences for balancing mission, presence, industrial base, and manning tensions. For example, if ship quantities are deferred to the future to accommodate near-term cost growth, the Navy could be trading off presence and industrial base if additional funds do not materialize in the future.

The Navy Consistently Underestimates the Effort Required to Successfully Execute Its New Shipbuilding Programs

Cost growth and schedule delays are persistent problems for shipbuilding programs as they are for other weapon systems. These challenges are amplified for lead ships in a class (see figs. 1 and 2).

Figure 1: Cost Growth in Recent Lead Ships (Dollars in Millions)

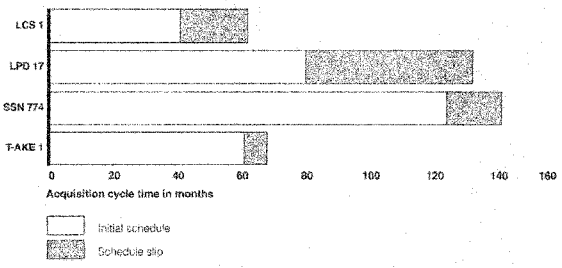


Source: GAO analysis of Navy data.

*SSN 775 is the second Virginia-class submarine, but represents the first hull delivered by Northrop Grumman Newport News shipyard.

Note: all ships with the exception of LCS 1-2 have been delivered to the Navy.

Figure 2: Delays in Achieving Initial Operating Capability in Recent Lead Ships



Source: GAO analysis of Navy data.

The Navy's six most recent lead ships[5] have experienced cumulative cost growth over $2.4 billion above their initial budgets. These cost challenges

[5]While SSN 775 does not use a different ship design, it was constructed by a different shipyard than SSN 774.

have been accompanied by delays in delivering capability totaling 97 months across these new classes. The first San Antonio-class ship (LPD 17) was delivered to the warfighter incomplete and with numerous mechanical failures—52 months late and at a cost of over $800 million above its initial budget. For the LCS program, the Navy established a $220 million cost target and 2-year construction cycle for each of the two lead ships. To date, costs for these two ships have exceeded $1 billion, and initial capability has been delayed by 21 months. Cost increases are also significant if the second ship is assembled at a different shipyard than the first ship. This was the case with SSN 775, with cost growth of well over $500 million.

These outcomes result from the Navy consistently framing its shipbuilding programs around unexecutable business cases, whereby ship designs seek to accommodate immature technologies and design stability is not achieved until late in production. New ship programs have moved forward through milestones, whether or not desired knowledge had been attained. In turn, initial ships in Navy programs require costly, time-consuming out-of-sequence work and rework during construction, and undesired capability trade-offs are often required. In essence, execution problems are built into the initial strategy for a new ship, as the scope of the ship—that is, the innovative content and complexity owing to multiple mission requirements—overmatches the time and money set aside to develop and construct the ship. For example, while the scope of the DDG 1000 and CVN 78 ships were driven by mission requirements, the schedules for these ships was set by shipyard workload needs or by the retirement schedule of a predecessor ship. The result is the scope of work is compressed into a schedule that is based on something else.

LCS is a recent example. In this program, the Navy sought to concurrently design and construct two lead ships in an effort to rapidly meet pressing needs in the mine countermeasures, antisubmarine warfare, and surface warfare mission areas. However, changes to Navy requirements required redesign of major elements in both lead ships to provide enhanced survivability, 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, rework, and weight increases on the lead ships. These difficulties caused LCS construction costs to grow and delivery schedules to be extended and prompted the Navy to reduce speed requirements for the class due to degraded hydrodynamic performance. In turn, the Navy canceled construction contracts for the third and fourth ships and used funds from other previously appropriated ships to pay for lead ship cost growth. Although these steps increased the resources

available to the two lead ships, continuing technology immaturity and unproven watercraft launch and recovery systems included within each design could trigger additional cost growth and schedule delays above and beyond current estimates.

The Ford-class aircraft carrier (CVN 78) also faces uncertainty related to its cost and schedule estimates and eventual capability. The business case for CVN 78 is framed around delivering the carrier to maintain the Navy's force of 11 operational carriers given the impending retirement of USS *Enterprise* (CVN 65), but includes a cost target that leaves little if any margin for error. As construction begins, remaining technology risk in the program—particularly with the electromagnetic aircraft launch system (EMALS)—has positioned the program to face future construction challenges similar to other lead ships. Previously, the Navy planned to demonstrate full functionality of a ship-ready system prior to production and installation on CVN 78—an approach aimed at reducing risk to ship construction. However, the contractor encountered technical difficulties developing the prototype generator and meeting detailed Navy requirements which left no margin in the schedule to accommodate unanticipated problems discovered in testing or production. In order to maintain the ship's construction schedule, the Navy adopted a test and production strategy that will test, produce, and ultimately install EMALS with a high degree of concurrency. At the same time test events are occurring, the Navy will authorize and begin production of EMALS intended for ship installation. While Navy officials recognize that concurrency is undesirable, they believe it is the only way to meet the ship's delivery date in September 2015. However, by moving ahead with production in order to accommodate schedule milestones, CVN 78 is at risk of cost growth and ultimately schedule changes if unexpected problems arise in EMALS testing.

Challenges Facing Current Programs Have Disrupted the Navy's Long-Range Construction Plans

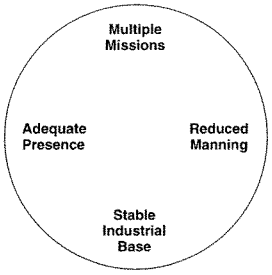
Since 2006, the Navy has annually issued a long-range plan for shipbuilding. These plans outline expected new ship procurements 30 years into the future and the funding the Navy estimates will be needed to support those procurements. The long-range plan is predicated upon the stated fleet need for 313 ships. However, mounting cost and schedule challenges in current programs have required the Navy to increasingly reshape its long-range ship procurement plans, placing the 313 ship goal in jeopardy.

The Navy's long-range ship construction plan embodies multiple objectives including

- building sophisticated ships to support new and existing missions,
- improving presence by increasing the numbers of ships available to execute these missions,
- designing ships and operating concepts that reduce manning requirements, and
- supplying construction workloads that stabilize the industrial base.

There is an inherent tension among the multiple objectives in the plan that is depicted in simple form in figure 3.

Figure 3: Multiple Objectives Embodied in the Navy Shipbuilding Plan



Source: GAO.

This tension can play out in several ways. If, for example, a class of ship is expected to perform multiple challenging missions, it will have sophisticated subsystems and costs will be high. The cost of the ship may prevent its being built in desired numbers, subsequently reducing presence and reducing work for the industrial base. Requirements to reduce manning can actually add sophistication if mission requirements are not reduced. To some extent, this has happened with DDG 1000 as decisions have tended to trade quantities (that affect presence and industrial base) in favor of sophistication. Several years ago, the program was expected to deliver 32 ships at an approximate unit cost of $1 billion. Over time, sophistication and cost of the ship grew as manning levels lower than current destroyers were maintained. Today, the lead ships are expected to

cost $8.9 billion in research and development funding and another $6.3 billion to build. Similarly, cost growth in the LCS program has precluded producing ships at the rate originally anticipated, and it is possible the Navy will never regain the recent ships it traded off to save cost. Had the Navy anticipated that LCS lead ship costs would more than double, it may have altered its commitment to the program within its previous long-range shipbuilding plan.

The Navy's fiscal year 2009 long-range ship construction plan reflects many of the recent challenges that have confronted Navy shipbuilding programs. The plan provides for fewer ships at a higher unit cost—in both the near term and the long term—from what the Navy outlined in its fiscal year 2008 plan. Across the next 5 years, the Navy now expects to fund construction of 47 new ships at a cost of almost $74 billion. However, only 1 year ago the Navy expected to purchase 60 ships at a cost of $75 billion during this same time span. Instead, as cost growth has mounted in current shipbuilding programs, the Navy has had to reallocate funds planned for future ships to pay for ones currently under construction. These problems have also required the Navy to adjust its long-term plans. To compensate for its recent near-term quantity reductions, the Navy now plans to increase construction rates starting in fiscal year 2014. This strategy is based upon the premise that increased funding—on the order of $22 billion between fiscal years 2014 and 2018—will become available to support its plans. The Navy assumes this trend of increased funding—above and beyond annual adjustments for inflation—will continue through the end of its plan, which culminates in fiscal year 2038.

Cost and schedule pressures in current programs have also led the Navy to make a number of operational trade-offs to help maintain the viability of its shipbuilding goals. For instance, the Navy's current long-range plan includes a new provision to extend the service lives of current DDG 51 ships by 5 years to maintain an adequate number of surface combatants in its fleet. In addition, the Navy plans to extend the service life of selected attack submarines as well as the length of attack submarine deployments. These actions, however, will require the Navy to increase funding for future upgrades, modernization programs, and maintenance for these vessels—from sources the long-range plan does not identify.

Concluding Remarks

The discussion over whether to conclude the DDG 1000 program at two ships should prompt some introspection given that over $13 billion has been spent. In a sense, some of the key factors influencing the discussion—such as the high cost of the ship, the potential for cost

growth, and the questionable affordability of the 30-year shipbuilding plan—are not markedly different from what they were a few years ago. Future success in shipbuilding depends on understanding why the weaknesses in the DDG 1000 business case, which now seem to threaten the program, did not prompt a similar re-examination several years ago.

I believe that Navy managers and shipbuilders have enough knowledge about cost estimating, technology development, engineering, and construction to develop more executable business cases for new ships—that is, a better match between the scope of the ship and the time and money allotted for delivering it. The fact remains that we do not get these matches when they really count—before detail design and construction for a new ship are approved. So, the question is, why are well-understood elements of success not incorporated into new ship programs?

Part of the answer is that while managers may know what it takes to put an executable business case together, compromises in judgment have to be made to bring the business case in conformance with competing demands. For example, in a program like the DDG 1000 that undertook multiple technical leaps to meet challenging requirements, yet also had to deliver in time to match shipyard availability, pressures existed to make optimistic assumptions about the pace of technology maturity. At the same time, budget constraints exert pressure on cost estimates to be lower. These demands do not all fall just within the province of the Navy—industry, Congress, and the Office of the Secretary of Defense all play important roles. Over time, the business case for DDG 1000 eroded. The primary mission of DDG 1000—and the foundation for its business case—was land attack. Yet, subsequent decisions ultimately forced trade-offs in that mission. For example, while including features like a more sophisticated radar and stealth characteristics may be good decisions individually, collectively they made the ship more expensive. Efforts to contain cost involved both reducing the quantity of ships and the actual land attack capability possessed by each individual ship. Ironically, the advanced gun system, which was the primary land attack weapon of the ship and a technical success to date, will now not have a platform to operate from beyond the first two DDG 1000s.

The reconsideration of the DDG 1000 buy reflects poorly on the requirements, acquisition, and funding processes that produced the ship's business case. Unless some attempt is made to examine the root causes of decisions that hope for the best and result in poor outcomes, shipbuilding programs seem destined to the same fate: despite the best efforts to manage, the scope of the program will outstrip the cost and schedule

budget. This examination must begin with an honest self-appraisal of what each player in the shipbuilding acquisition process demands of programs in terms of requirements, technologies, design, industrial base, quantities, and cost. Otherwise, while cost and other problems of current ships are lamented, these same problems could continue to curb the outcomes of future programs like the potentially sophisticated next-generation cruiser (CG(X)) or even renewed construction of DDG 51.

Mr. Chairman, that concludes my statement. I would be pleased to answer any questions.

Objectives, Scope, and Methodology

To develop information on the status of the DDG 1000 program, we relied largely on our current work examining the DDG 1000 program, as well as a number of prior GAO products on shipbuilding programs. We supplemented this work with analysis of the Navy's most recent and previous long-range plan for ship construction and Selected Acquisition Reports for current Navy ships. Finally, we updated our estimates of lead ships costs through the use of the Navy's budget justification documentation.

Contact and Staff Acknowledgments

For future questions about this statement, please contact me at (202) 512-4841 or francisp@gao.gov. Individuals making key contributions to this statement include Marie P. Ahearn, Christopher R. Durbin, Brian Egger, James Madar, Diana Moldafsky, Gwyneth B. Woolwine, and Karen Zuckerstein.

Related GAO Products

Defense Acquisitions: Cost to Deliver Zumwalt-Class Destroyers Likely to Exceed Budget. GAO-08-804. Washington, D.C.: July 31, 2008.

Defense Acquisitions: Assessments of Selected Weapon Programs. GAO-08-467SP. Washington, D.C.: March 31, 2008.

Defense Acquisitions: Overcoming Challenges Key to Capitalizing on Mine Countermeasures Capabilities. GAO-08-13. Washington, D.C.: October 12, 2007.

Defense Acquisitions: Realistic Business Cases Needed to Execute Navy Shipbuilding Programs. GAO-07-943T. Washington, D.C.: July 24, 2007

Defense Acquisitions: Navy Faces Challenges Constructing the Aircraft Carrier Gerald R. Ford within Budget. GAO-07-866. Washington D.C.: August 23, 2007.

Defense Acquisitions: Challenges Remain in Developing Capabilities in Naval Surface Fire Support. GAO-07-115. Washington, D.C.: November 30, 2006.

Defense Acquisitions: Challenges Associated with the Navy's Long-Range Shipbuilding Plan. GAO-06-587T. Washington, D.C.: March 30, 2006.

Defense Acquisitions: Progress and Challenges Facing the DD(X) Surface Combatant Program. GAO-05-924T. Washington, D.C.: July 19, 2005.

Defense Acquisitions: Plans Need to Allow Enough Time to Demonstrate Capability of First Littoral Combat Ships. GAO-05-255. Washington, D.C.: March 1, 2005.

Defense Acquisitions: Improved Management Practices Could Help Minimize Cost Growth in Navy Shipbuilding Programs. GAO-05-183. Washington, D.C.: February 28, 2005.

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WITNESS RESPONSES TO QUESTIONS ASKED DURING THE HEARING

JULY 31, 2008

RESPONSE TO QUESTION SUBMITTED BY MR. LANGEVIN

Admiral MCCULLOUGH. The Joint Requirements Oversight Council (JROC) was not specifically engaged in the Navy's deliberations prior to submission of the Navy's POM-10 proposed plan to the Office of the Secretary of Defense. The JROC will be briefed 18 July 2008.

The Navy is concerned about evolving capability gaps in the outer air battle in the blue water, particularly against the improved ballistic missile capabilities of near-peer competitors. The DDG 51 is a proven, multi-mission guided missile destroyer and the Navy's most capable ship against ballistic missile threats. Ballistic Missile Defense is a key capability that DDG 1000 lacks—that capability is already being incorporated into the DDG 51 class.

The way ahead for FY 2010 and beyond will be determined by the Navy and the Department of Defense's continuing assessment of existing and evolving threats, ensuring that the Navy delivers those capabilities best suited to meet our national security needs both now and the foreseeable future. This will include, but not be limited to, defense against missile threats and the challenging requirements to operate in the littoral environments. As the Navy and the Department of Defense develops its FY 2010-2015 budget, all of these considerations will be weighed to ensure we build the right Navy for the future. [See page 21.]

RESPONSE TO QUESTION SUBMITTED BY MR. TAYLOR ON BEHALF OF MR. LARSEN

Admiral MCCULLOUGH. The comprehensive estimate of total life cycle costs for the DDG 51 and DDG 1000 classes is stated in the Selected Acquisition Reports (SAR's) provided to Congress. These life cycle cost estimates employ data from the Navy Visibility and Management of Operating and Support Costs (VAMOSC) database. They include both direct costs and other categories of costs that are not budgeted to a specific program. The summary of the SAR Life Cycle Cost estimates (FY07$) for the two classes are:

Category	DDG 1000	DDG 51
Mission Pay and Allowance	7.2	22.8
Unit Level Consumption	11.0	12.6
Intermediate Maintenance	0.8	0.8
Depot Maintenance	10.9	7.6
Contractor Support	—	0.9
Sustaining Support	15.4	3.3
Indirect	4.8	12.8
Other	—	—
Total Annual	50.1	60.8
All costs in FY07$ based on December 2007 SAR's.		

The Navy has also provided Congress a comparison of average annual costs directly programmed or planned to be programmed for the two ship classes. These costs are based on programming models including inputs based on regional man-day rates, a modular maintenance cost model, steaming day operating cost model, shore support cost model, and off-ship maintenance models. Additionally, these programming estimates only include direct costs associated with ship operations. The comparison based on the programming models is:

Category	**DDG 1000**	**DDG 51**
Operating (Steaming)	$18.5	$15.7
Maintenance	$10.3	$5.6
Manpower	$8.5	$19.9
Total Annual	$37.5	$41.2
All costs in FY07 $.		

Both of these sources are valid, but generated from different models/assumptions and are used for different purposes (comprehensive estimate of total ownership costs vs. budget programming).

In both the programming budget comparison and the SAR data, DDG 1000 operating and support costs are slightly less than for the DDG 51, reflecting the lower manning of DDG 1000 but higher maintenance cost due to ship size and the transfer of a portion of traditionally crew-conducted maintenance to shore facilities. [See page 24.]

RESPONSE TO QUESTION SUBMITTED BY MR. KENNEDY

Admiral MCCULLOUGH. The DDG 51-class average days underway in FY07 was 138 days. The DDG 1000 average days underway is projected to be 149 days per year. Underway days are based on a 91% historic availability of DDG 51 and a 94% predicted availability of DDG 1000. [See page 35.]

RESPONSE TO QUESTION SUBMITTED BY MR. TAYLOR

Mr. LABS. The cost of fuel that the Navy used in its comparison of operating costs of the DDG-51 destroyer and the DDG-1000 destroyer was $112.14 per barrel. The Navy performed that comparison in February 2008. [See page 40.]

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