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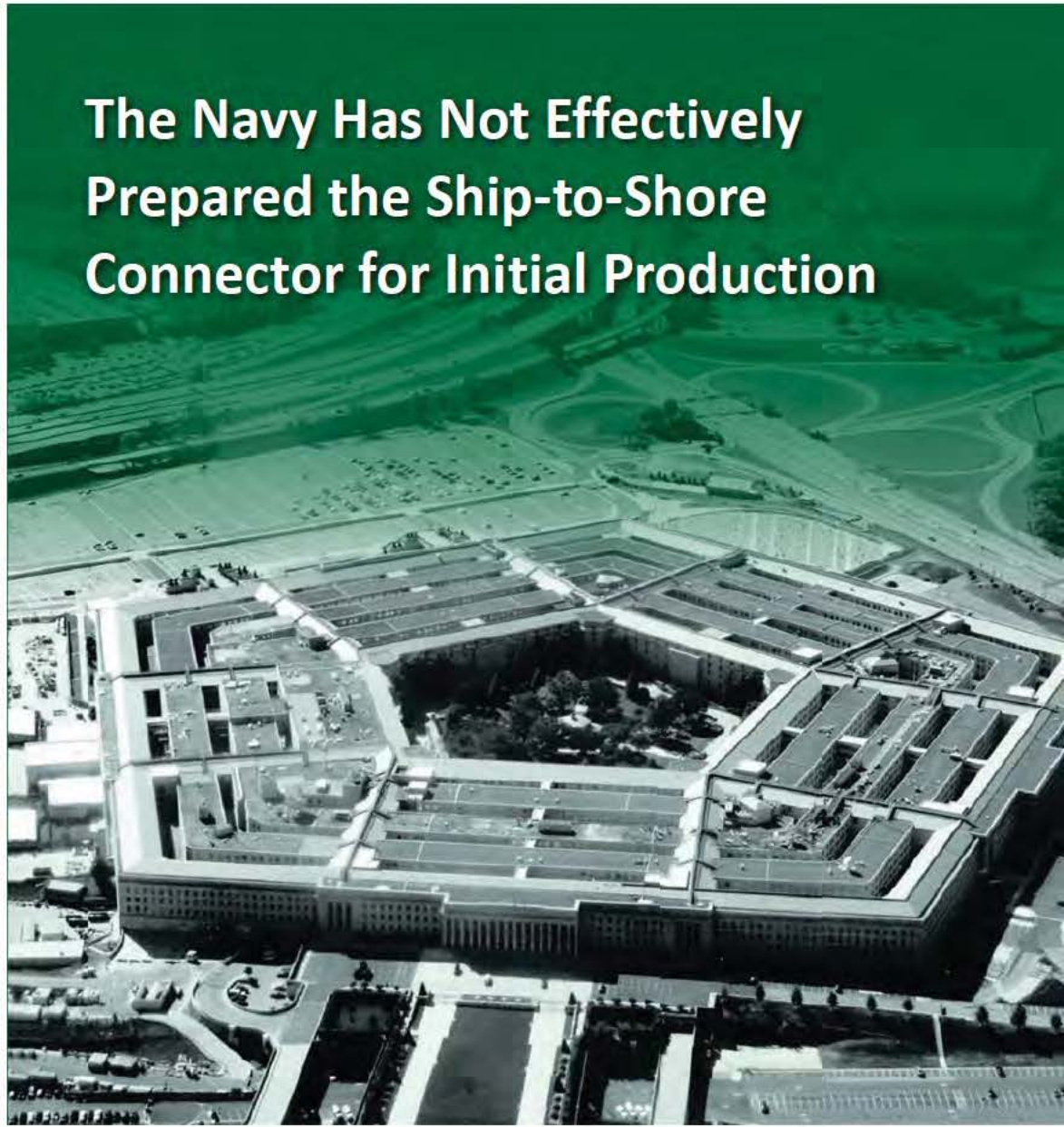
INSPECTOR GENERAL

U.S. Department of Defense

FEBRUARY 12, 2015



The Navy Has Not Effectively Prepared the Ship-to-Shore Connector for Initial Production



INTEGRITY ★ EFFICIENCY ★ ACCOUNTABILITY ★ EXCELLENCE

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Results in Brief

The Navy Has Not Effectively Prepared the Ship-to-Shore Connector for Initial Production

February 12, 2015

Objective

Our audit objective was to determine whether the Navy was effectively preparing and managing the Ship-to-Shore Connector (SSC) program for low-rate initial production (initial production).

Finding

~~(FOUO)~~ The Navy has not effectively prepared the SSC program for the initial production decision planned for February 2015. Specifically, Amphibious Warfare Program (PMS377) officials planned to proceed to the initial production decision without completing developmental testing to verify the SSC can meet all operational requirements. PMS377 officials did not:

- establish specific and demonstrable exit criteria for the system development phase for three of five testing elements,
- plan to complete component testing of the top technical risks to the SSC program,
- ~~(FOUO)~~ plan to complete testing of the production representative craft until May 2017, or
- ~~(FOUO)~~ NAVSEA: (b) (5) [REDACTED]

Finding (cont'd)

~~(FOUO)~~ This occurred because PMS377 officials incorrectly managed the SSC as a ship acquisition program, which allowed significant developmental testing to occur after the initial production decision. Additionally, the Milestone Decision Authority approved the acquisition strategy. As a result of the PMS377 officials' plan to conduct concurrent developmental testing and production, any design and integration deficiencies found during production may require the Navy to make substantial and costly modifications to SSC craft already being built. PMS377 officials planned to exercise contract options for the production of seven craft, at an estimated cost of \$~~(FOUO)~~ DoD OIG: (b) (4), before they received developmental test data that verified the SSC can meet all operational requirements.

Recommendations

We recommend the Under Secretary of Defense for Acquisition, Technology, and Logistics direct the Assistant Secretary of the Navy (Research, Development, and Acquisition) to implement a non-ship acquisition strategy for the SSC program and approve testing exit criteria for the initial production decision that are in accordance with DoD acquisition guidance. Also, we recommend the Program Manager, PMS377, manage the SSC program as a non-ship major defense acquisition program and complete developmental testing of the production representative craft to verify the SSC can meet all operational requirements before the initial production decision and before the exercise of contract options. Additionally, the Program Manager, PMS377, should revise testing exit criteria for the initial production decision to be specific and demonstrable.



Results in Brief

The Navy Has Not Effectively Prepared the Ship-to-Shore Connector for Initial Production

Management Comments and Our Response

The Assistant Secretary of Defense (Acquisition), responding for the Under Secretary of Defense for Acquisition, Technology, and Logistics, stated she partially agreed with the recommendations. However, the response did not address the specifics of the recommendations. The Assistant Secretary of the Navy (Research, Development, and Acquisition), responding for the Program Manager, PMS377, did not agree with the recommendations. He stated the Navy, with approval from the Under Secretary of Defense for Acquisition, Technology, and Logistics, executed the SSC program in accordance with Interim DoD Instruction 5000.02. However, the Navy response did not address the specifics of all the recommendations. We request the Under Secretary of Defense for Acquisition, Technology, and Logistics and Program Manager, PMS377, provide additional comments to the final report. Please see the Recommendations Table on the next page.

Recommendations Table

Management	Recommendations Requiring Comment	No Additional Comments Required
Under Secretary of Defense for Acquisition, Technology, and Logistics	1.a, 1.b	
Program Manager, Amphibious Warfare Program	2.a, 2.b, 2.c	

Please provide Management Comments by March 13, 2015.



**INSPECTOR GENERAL
DEPARTMENT OF DEFENSE
4800 MARK CENTER DRIVE
ALEXANDRIA, VIRGINIA 22350-1500**

February 12, 2015

MEMORANDUM FOR UNDER SECRETARY OF DEFENSE FOR ACQUISITION,
TECHNOLOGY, AND LOGISTICS
ASSISTANT SECRETARY OF THE NAVY (RESEARCH,
DEVELOPMENT, AND ACQUISITION)
PROGRAM MANAGER, AMPHIBIOUS WARFARE PROGRAM

SUBJECT: The Navy Has Not Effectively Prepared the Ship-to-Shore Connector for Initial
Production (Report No. DODIG-2015-079)

~~(FOUO)~~ We are providing this report for review and comment. We determined the Navy Amphibious Warfare Program officials planned to spend \$^{NAVSEA: (b) (5)} to produce ^{NAVSEA: (b) (5)} Ship-to-Shore Connector craft without completing developmental testing to verify the craft can meet all operational requirements. The program officials' plan to conduct concurrent developmental testing and production puts the Navy at risk of discovering design and integration deficiencies during production that could require substantial and costly modifications to craft already being built. We conducted this audit in accordance with generally accepted government auditing standards.

We considered management comments on a draft of this report when preparing the final report. DoD Directive 7650.3 requires that recommendations be resolved promptly. The response from the Assistant Secretary of Defense (Acquisition), responding for the Under Secretary of Defense for Acquisition, Technology, and Logistics, did not address the specifics of Recommendation 1. Furthermore, the response from the Assistant Secretary of the Navy (Research, Development, and Acquisition), responding for the Program Manager, did not address the specifics of Recommendation 2. Therefore, we request the Under Secretary and Program Manager provide additional comments to the final report. Please provide comments that conform to the requirements of DoD Directive 7650.3 by March 13, 2015.

Please send a PDF file containing your comments to api@dodig.mil. Copies of your comments must have the actual signature of the authorizing official for your organization. We cannot accept the /Signed/ symbol in place of the actual signature. If you arrange to send classified comments electronically, you must send them over the SECRET Internet Protocol Router Network (SIPRNET).

We appreciate the courtesies extended to the staff. Please direct questions to me at (703) 604-9077 (DSN 664-9077).

A handwritten signature in cursive script, reading "Jacqueline L. Wicecarver", is positioned above the typed name.

Jacqueline L. Wicecarver
Assistant Inspector General
Acquisition, Parts, and Inventory

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Introduction

Objective

Our audit objective was to determine whether the Navy was effectively preparing and managing the Ship-to-Shore Connector (SSC) program for low-rate initial production (initial production). See Appendix A for a discussion of the scope and methodology and prior audit coverage.

Background

The Navy's SSC program is an Acquisition Category IC major defense acquisition program managed by the Amphibious Warfare Program Office (PMS377). An Acquisition Category IC program has research, development, test, and evaluation costs of more than \$480 million or procurement costs of more than \$2.79 billion. The Milestone Decision Authority for an Acquisition Category IC is the DoD Component head or, if delegated, the DoD Component acquisition executive.

~~(FOUO)~~ On July 5, 2012, the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)), the Milestone Decision Authority, approved the SSC acquisition strategy and the program to enter the system development phase of the acquisition process. The USD(AT&L) served as the SSC Milestone Decision Authority until July 24, 2012, when he delegated his authority to the Assistant Secretary of the Navy (Research, Development, and Acquisition) (ASN(RD&A)), as requested by the Navy. The USD(AT&L) indicated the Navy had enough experience to manage the SSC program. The ASN(RD&A) is responsible and accountable for all Navy acquisition programs and functions and represents the Department of Navy when reporting to the USD(AT&L) and Congress for all acquisition matters.

Ship-to-Shore Connector to Replace Landing Craft Air Cushion

~~(FOUO)~~ The SSC is an air-cushioned water-to-land craft that will allow the Navy to transport weapons, equipment, vehicles, supplies, and personnel from ship to shore. The Navy expects the SSC to travel at more than 35 knots while carrying 74 tons of cargo weight. The Landing Craft Air Cushion (LCAC) is an air-cushioned water-to-land craft nearing the end of its service life. The Navy designed the LCAC for a 20-year service life; and, beginning in 2003, the Navy invested additional money in the LCAC to extend its service life approximately 10 years. The Navy expects an air-cushioned water-to-land craft capability gap to exist between 2015 and 2024, with a peak deficit of more than 15 craft in 2019.

The SSC will replace the LCAC, but will be of similar size and shape to remain compatible with existing Navy amphibious ships. The SSC primary design enhancements over the LCAC include increased cargo weight capacity and improved reliability. The following figure shows an illustration of the SSC craft.



Figure. SSC Craft
Source: PMS377

Ship-to-Shore Connector Production Plan and Contract

~~(FOUO)~~ PMS377 officials planned the initial production decision for February 2015 and planned to produce 1 production representative craft¹ for testing and 72 operational craft. PMS377 officials estimated the SSC program total life-cycle costs are approximately \$~~(b) (5)~~ and that each SSC craft will cost approximately \$~~(b) (5)~~.

~~(FOUO)~~ On July 6, 2012, the Navy awarded a \$213 million contract for the design and construction of the production representative craft. The Navy will use the craft as a test article, and it will not be part of the SSC operational assets. The contract also included the construction of craft 1 as a test backup if the production representative craft failed during testing. Craft 1 will become part of the SSC operational assets. After the initial production decision, PMS377 officials planned to exercise options for craft 2 and 3 by March 31, 2015 and ~~(b) (5)~~. PMS377 officials estimated the future contract options for these ~~(b) (5)~~ operational craft to cost \$~~(b) (5)~~.

¹ A production representative craft is a complete system that demonstrates operational capabilities and supports mission needs.

Defense Acquisition Regulations

DoD Directive 5000.01, "The Defense Acquisition System," November 20, 2007, provides management principles and mandatory policies and procedures for managing all acquisition programs. The Defense Acquisition System is the management process DoD uses to provide effective, affordable, and timely systems to the users. Interim DoD Instruction 5000.02, "Operation of the Defense Acquisition System," November 25, 2013, provides detailed procedures to guide defense acquisition program management.²

Developmental Testing

Developmental testing plays a critical role in the system development phase. It assists in the development and maturing of components and the system before the initial production decision. Program offices use developmental testing to verify status of technical progress, verify that design risks are minimized, and substantiate achievement of component and system performance. Early developmental testing is important because program offices can find and fix deficiencies at a lower cost while the system is still in development.

Review of Internal Controls

DoD Instruction 5010.40, "Managers' Internal Control Program Procedures," May 30, 2013, requires DoD organizations to implement a comprehensive system of internal controls that provides reasonable assurance that programs are operating as intended and to evaluate the effectiveness of the controls. We identified an internal control weakness. PMS377 officials, with the Milestone Decision Authority approval, did not manage the SSC in accordance with DoD acquisition guidance. PMS377 officials incorrectly managed the SSC as a ship acquisition program, which allowed significant developmental testing to occur after the initial production decision. We will provide a copy of the report to the senior official responsible for internal controls in the Department of the Navy.

² On January 7, 2015, the USD(AT&L) issued the new DoD Instruction 5000.02. The new DoD Instruction 5000.02 contains the same policies and requirements as cited in this report.

Finding

Navy Has Not Completed Adequate Developmental Testing on the Ship-to-Shore Connector

(FOUO) The Navy has not effectively prepared the SSC program for the initial production decision planned for February 2015. Specifically, PMS377 officials planned to proceed to the initial production decision without completing developmental testing to verify the SSC can meet all operational requirements. PMS377 officials did not:

- establish specific and demonstrable exit criteria for the system development phase for three of five testing elements,
- plan to complete component testing of the top technical risks to the SSC program,
- (FOUO) plan to complete testing of the production representative craft until May 2017, or
- (FOUO) NAVSEA: (b) (5) [REDACTED]

(FOUO) This occurred because PMS377 officials incorrectly managed the SSC as a ship acquisition program, which allowed significant developmental testing to occur after the initial production decision. Additionally, the Milestone Decision Authority approved the acquisition strategy. As a result of the PMS377 officials' plan to conduct concurrent developmental testing and production, any design and integration deficiencies found during production may require the Navy to make substantial and costly modifications to SSC craft already being built. PMS377 officials planned to exercise contract options for the production of seven craft, at an estimated cost of \$ NAVSEA: (b) (5) [REDACTED], before they received developmental test data that verified the SSC can meet all operational requirements.

Adequate Developmental Testing Needed

PMS377 officials planned to proceed to the initial production decision without completing developmental testing to verify the SSC can meet all operational requirements. Interim DoD Instruction 5000.02 states, for all defense acquisition programs, program offices develop, build, and test a system to verify that all operational requirements have been met before initial production. Successful completion of adequate testing with a production representative article will normally be the primary basis for entering initial production. The initial production decision, usually based on developmental testing results, commits the resources required to enter production. Evidence from testing that the product design is stable is the critical consideration for this decision.

The DoD Test and Evaluation Management Guide states, throughout the system development phase, developmental testing activities should assess technical performance. Developmental testing is a critical part of designing, building, and testing a product to identify and fix deficiencies. It is an iterative step of the DoD acquisition process to achieve desired results. Developmental testing determines whether operational requirements can be met.

(FOUO) PMS377 officials established developmental testing activities to verify the SSC can meet operational requirements. PMS377 officials planned to conduct paper studies and analyses; complete required certifications; train manpower to support testing; and test modified LCAC and SSC subcomponents and components, software integration, and SSC production representative craft. However, PMS377 officials did not plan to complete most of the developmental testing activities until May 2017, more than 2 years after the initial production decision.

(FOUO)
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did not plan to
complete most...
developmental testing...
until...2 years after the
initial production
decision.

Exit Criteria for System Development Phase Need Revision

PMS377 officials did not establish specific and demonstrable exit criteria for the system development phase for three of five testing elements. A PMS377 official stated representatives from the Office of the USD(AT&L) wanted the program to develop precise exit criteria, but it was too difficult to achieve in a competitive environment when PMS377 officials had not yet selected a contractor to produce the SSC.

~~(FOUO)~~ According to a DoD Developmental Test and Evaluation annual report from March 2013, PMS377 officials worked with the Deputy Assistant Secretary of Defense for Developmental Test and Evaluation (DASD[DT&E]) to formulate the exit criteria. PMS377 officials developed exit criteria they could reasonably accomplish during testing before the initial production decision rather than exit criteria that would demonstrate completion of a specific event. Three exit criteria that were not specific and demonstrable included initiation of:

- Gearbox first article test,³
- Shafting first article test, and
- Main engine certification test.

~~(FOUO)~~ Interim DoD Instruction 5000.02 requires specific exit criteria that program offices must achieve before proceeding into the next acquisition phase. The Defense Acquisition University states exit criteria must be specific and demonstrable during the applicable acquisition phase. Exit criteria require a level of demonstrated performance or completion of specific events. However, the USD(AT&L) approved exit criteria for testing that did not require successful completion of critical SSC component testing. For example, the exit criteria required PMS377 officials to start first article testing before the initial production decision; however, initiation did not provide PMS377 officials adequate test data to evaluate first article performance. When asked about the exit criteria for first article testing, a representative from the Office of the USD(AT&L) responded that the Interim Instruction provides a flexible framework. Although Interim DoD Instruction 5000.02 provides flexibilities for program management, it requires specific exit criteria and does not state program offices can deviate from this requirement. PMS377 officials should revise testing exit criteria for the initial production decision to be specific and demonstrable. Additionally, the Milestone Decision Authority should review and approve exit criteria that are in accordance with Interim DoD Instruction 5000.02.

Test Plans to Lower Top Technical Risks

~~(FOUO)~~ PMS377 officials did not plan to complete component testing of the top technical risks to the SSC program before the initial production decision planned for February 2015. PMS377 officials identified software, drivetrain integration, and main engine development as the SSC top technical risks. Table 1 shows the top technical risk areas that could result in increased cost, delayed schedule, and a reduction in performance.

³ First article testing is used to confirm the contractor delivers a product that meets the established technical criteria.

Table 1. SSC Top Technical Areas with Risk Ratings

Technical Risk Area	Consequence to Cost, Schedule, and Performance	Likelihood of Occurrence	Overall Rating
Software	Severe ¹	Low	Moderate
Drivetrain Integration	Significant ²	Moderate	Moderate
Main Engine Development	Significant ²	Low	Moderate

¹ Severe degradation in technical performance; cannot meet system capability requirements; will jeopardize program success, and no workarounds available.

² Significant degradation in technical performance or major shortfall in supportability; may jeopardize program success; and workarounds may not be available or may have negative consequences.

Source: PMS377

(FOUO) PMS377 officials stated software represented the highest technical risk to successful SSC development. PMS377 officials determined software was a risk area because of the inherent nature of software development and integration. PMS377 officials developed a risk mitigation plan to lower software risk gradually over time. However, PMS377 officials did not plan to begin lowering the risk from moderate to low until October 2016. Furthermore, PMS377 officials estimated the contractor would not complete integrated software testing on a production representative craft until March 2017, more than 2 years after the initial production decision.

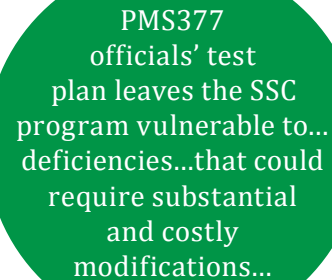
(FOUO) PMS377 officials identified the SSC drivetrain integration as a top risk because [REDACTED]
PMS377 officials [REDACTED]
[REDACTED]
[REDACTED] PMS377 officials developed a risk mitigation plan to lower the integration risk from moderate to low gradually over time. However, PMS377 officials [REDACTED]
[REDACTED]
[REDACTED] Only after this testing could PMS377 officials lower the integration risk from moderate to low.

(FOUO) PMS377 officials identified the main engine development as a top risk because, although the engine was mature, it required modifications to meet ocean environment certification. The certification required the main engine to endure sand, dust, and salt water ingestion testing. The main engine is a critical component to successful drivetrain integration. PMS377 officials developed a risk mitigation plan to lower the risk gradually over time. In February 2013, PMS377

⁴ The drivetrain comprises several components such as main engine, gearboxes, fans, bearings, shafting, generator, and propulsors.

~~(FOUO)~~ officials estimated main engine certification testing would last more than a year and run past the initial production decision. As of October 2014, PMS377 officials planned to conduct main engine certification testing over 4 months and complete it by the initial production decision planned for February 2015. However, if PMS377 officials need more than 4 months to complete the testing, they will not have all test results by the planned initial production decision.

PMS377 officials did not plan to lower the top technical risks from moderate to low before entering initial production. PMS377 officials' test plan leaves the SSC program vulnerable to discovering design and integration deficiencies during production that could require substantial and costly modifications to craft already being built.



PMS377 officials' test plan leaves the SSC program vulnerable to... deficiencies...that could require substantial and costly modifications...

Testing of Production Representative Craft Two Years After Initial Production Decision

~~(FOUO)~~ PMS377 officials did not plan to complete the production representative craft testing until May 2017 to verify the SSC can meet all operational requirements. For example, one of the SSC operational requirements is to transport 74 tons of cargo weight, a 23 percent increase over the LCAC. PMS377 officials will not have developmental test data to verify the SSC can meet the cargo weight requirement until production representative craft testing, which is planned for over 2 years after the initial production decision. However, Interim DoD Instruction 5000.02 requires program offices to develop, build, and test a product to verify it meets all operational requirements to support production decisions.

In the DoD Developmental Test and Evaluation annual report from March 2013, the Acting DASD(DT&E) rated the SSC as moderate to high risk because the Navy redesigned all major SSC components. The Acting DASD(DT&E) considered all major SSC components new, and stated some had not been used in a marine environment. He determined the program schedule was inadequate because PMS377 officials did not plan for production representative craft testing to support the initial production decision. To address the Acting DASD(DT&E)'s concerns, PMS377 officials planned a high-level DoD advisory review at the completion of the production representative craft testing. During the review, PMS377 officials will brief significant craft design deficiencies discovered during testing and modifications incorporated to address design deficiencies. However, because

PMS377 officials planned to test production representative craft after production begins, any design and integration deficiencies discovered at this late stage may be more costly to fix and could delay craft deployment.

Additional Reliability Testing and Analysis Needed

(FOUO) PMS377 officials [REDACTED] PMS377 officials defined SSC reliability as [REDACTED] PMS377 officials' plan for [REDACTED] [REDACTED] [REDACTED] [REDACTED]

(FOUO) PMS377 officials stated they needed the contractor's reliability data to assess SSC reliability improvement. They required the contractor to submit reliability data through contract deliverables. However, [REDACTED] [REDACTED]. PMS377 officials stated that [REDACTED] [REDACTED] Navy officials explained the purpose of the initial submission was to evaluate the contractor reliability analysis process. Navy officials provided feedback on numerous additional submissions for three reliability contract deliverables.⁵ As of December 11, 2014, the Navy approved the first of the three contract deliverables. [REDACTED] [REDACTED] [REDACTED]

(FOUO) PMS377 officials stated they initiated a two-part operational assessment⁶ [REDACTED]. Navy officials conducted the first part in July 2014, which covered assessment requirements with the exception of reliability. On December 11, 2014, Navy officials conducted the second part [REDACTED]. A representative from the office of Commander Operational Test and Evaluation Force⁷ stated the reliability discussion was good; however, it appeared the SSC had not been through much testing and most data was historical. In addition, he stated they had [REDACTED] because PMS377

⁵ Three reliability contract deliverables were—(1) craft-level reliability, availability, and maintainability analysis report; (2) reliability, availability, and maintainability program plan; and (3) failure mode, effects and criticality analysis report.

⁶ An operational assessment is a test event conducted before initial production units are available to evaluate system operational effectiveness and suitability.

⁷ The Operational Test and Evaluation Force is an independent Navy Operational Test and Evaluation agency that is responsible for assessing the effectiveness and suitability of systems and how those systems affect the warfighter's mission.

(FOUO) officials [REDACTED]

[REDACTED] If PMS377 officials' reliability predictions changed, the operational assessment results could be impacted and delay the planned February 2015 initial production decision.

(FOUO) A PMS377 official stated the Navy will use testing to assess reliability. However, PMS377 officials planned to conduct component testing over 2½ years, with only 6 months of the tests occurring before the initial production decision. For example, the drivetrain

(FOUO)
Representatives from the Office of the DASD(DT&E) expressed concern over reliability and stated high component reliability does not mean high craft reliability.

was not only a top technical risk but also a critical reliability component, and PMS377 officials did not plan to complete drivetrain testing until early 2017. Representatives from the Office of the DASD(DT&E) expressed concern over reliability and stated high component reliability does not mean high craft reliability. The first opportunity PMS377 officials will have to discover craft reliability design and integration deficiencies

will occur during contractor testing of the production representative craft, about 2 years after the SSC entered initial production.

Adequate reliability testing and analysis are critical to the early discovery of potential SSC design and integration deficiencies during the system development phase. Reliability is a prime determinant of long-term support costs and has serious implications to the SSC's operational suitability and affordability.

Navy Officials Used a Ship Acquisition Strategy to Acquire Ship-to-Shore Connector Craft

(FOUO) PMS377 officials incorrectly managed the SSC as a ship acquisition program, which allowed significant developmental testing to occur after the initial production decision. Secretary of the Navy Instruction 5000.2E, "Department of the Navy Implementation and Operation of the Defense Acquisition System and the Joint Capabilities Integration and Development System," September 1, 2011, indicates lead and initial follow-on ships are normally approved at Milestone B, which means that program offices contract for additional ships before they test the

(FOUO)
PMS377 officials incorrectly managed the SSC as a ship acquisition program, which allowed significant developmental testing to occur after the initial production decision.

~~(FOUO)~~ first ship.⁸ PMS377 officials used this strategy, approved by the Milestone Decision Authority,⁹ and planned to award contract options for craft 2 through 8 before conducting production representative craft testing.

DoD and Navy acquisition guidance provides program offices with flexibility on how to structure and manage ship acquisition programs because ships are different than other major weapon system programs, such as aircraft. Specifically:

- Interim DoD Instruction 5000.02 states ship acquisition programs do not produce prototypes for use solely as test articles during the system development phase because of their high unit cost. If program offices use a test article, it must become fully operational for deployment as part of ship operational assets.
- Naval Sea Systems Command Technical Publication S9800-AC-MAN-010, "Ship Design Manager (SDM) and Systems Integration Manager (SIM) Manual," February 13, 2012, addresses DoD and Navy acquisition regulations and ship design policies and practices. The manual states ship programs have high unit costs, very low quantities, and evolving requirements.

~~(FOUO)~~ However, the SSC does not meet the DoD and Navy's characteristics of a ship. PMS377 officials' document, "Ships Are Different," undated, indicated ships are "huge" and "complex to construct." The document stated ships provide multi-mission operations such as carrying aircraft, serving as hospitals and hotels, and providing intelligence-gathering operations and force protection. Table 2 provides examples of SSC characteristics that differ from ship acquisition programs.

~~(FOUO)~~ Table 2. Differences Between Ships and the SSC

Ship Characteristics	SSC Characteristics
Multi-mission	Single mission
First ship is fully operational and part of ship operational assets	First SSC is a test article and not part of SSC operational assets
High unit costs (\$ (S) NAVSEA: (b) average unit cost)	Low unit costs (\$ (S) NAVSEA: (b) (5) average unit cost)
Low quantities (1 to few)	High quantities (72 operational craft)
Evolving requirements	Stable requirements

~~(FOUO)~~

⁸ According to the Interim DoD Instruction 5000.02, Milestone B approval provides authorization to enter into the system development phase, which includes developmental testing activities.

⁹ The USD(AT&L) was the Milestone Decision Authority who approved the acquisition strategy.

(FOUO) PMS377 officials stated the Navy builds ships, making the SSC a ship acquisition program. They also stated that the SSC was replacing the existing, successful, LCAC program and was following an acquisition approach similar to the LCAC. Additionally, PMS377 officials stated several DoD and Navy entities were involved in making decisions to develop the SSC as a ship acquisition program. Secretary of the Navy Instruction 5030.8B, "General Guidance for the Classification of Naval Vessels and Battle Force Ship Counting Procedures," March 7, 2014, provides guidance for naval ship classification and requires commissioned ships be maintained in the Naval Vessel Register. The Instruction states SSC is a non-commissioned vessel. The Navy does not maintain SSC in the Naval Vessel Register as part of the Navy's ship inventory. The Milestone Decision Authority should implement a non-ship acquisition strategy for the SSC. Additionally, PMS377 officials should manage the SSC as a non-ship acquisition program in accordance with DoD and Navy guidance.

Concurrent Developmental Testing and Production of Ship-to-Shore Connector Craft

As a result of PMS377 officials' plan to conduct concurrent developmental testing and production, any design and integration deficiencies found during production may require the Navy to make substantial and costly modifications to SSC craft already being built. In June 2012, before the system development phase, the Office of the Deputy Assistant Secretary of Defense for Systems Engineering reported a manufacturing concurrency risk because PMS377 officials planned to award contract options to produce additional craft before completing integrated tests of the production representative craft. The Office of the Deputy Assistant Secretary of Defense for Systems Engineering stated the construction of additional craft, before PMS377 performs and analyzes integrated tests of the production representative craft, introduces the risk of immature manufacturing processes and craft rework.

(FOUO) A PMS377 official stated that if the Navy did not begin initial production in February 2015, it would be unable to execute the contract options for craft 2 through 8 at previously negotiated prices. Another PMS377 official stated the Navy must initiate construction [REDACTED] and replace the aging LCAC. According to the DoD Developmental Test and Evaluation annual report from March 2013, PMS377 officials indicated it would cost \$15 million to delay the contract option for craft 2 and 3 after March 31, 2015. Navy officials stated they estimated costs of \$ [REDACTED] to delay the contract option for 6 to 12 months, \$ [REDACTED] for SSC acquisition, and \$ [REDACTED] for additional

(FOUO) LCAC sustainment. However, as of December 31, 2014, PMS377 officials had not provided additional information to substantiate the estimate or to justify the risk of producing craft before completing adequate developmental testing. PMS377 officials should complete developmental testing of the production representative craft to verify the SSC can meet all operational requirements before the initial production decision and before the exercise of contract options.

Conclusion

(FOUO) PMS377 officials used a ship acquisition strategy, approved by the Milestone Decision Authority, to develop the SSC and planned to spend \$[REDACTED] to produce

[REDACTED] SSC craft [REDACTED]

[REDACTED] By using a ship acquisition strategy to develop a major defense acquisition program that did not meet the characteristics of a ship, PMS377 officials and the Milestone Decision Authority put the Navy at risk of discovering significant SSC deficiencies after production begins.

In 2013, DASD(DT&E) launched an initiative to shift more developmental testing to the system development phase before committing to production. DASD(DT&E) advocated test strategies and plans that ensured rigorous developmental testing with greater mission focus to evaluate performance and reliability. While the DASD(DT&E) initiative was introduced after the SSC acquisition strategy was approved, developmental testing plays a critical role in the system development phase because it assists in the maturing of components and the craft before initial production. All the major components of the SSC are new, and some have not been used in a marine environment. Therefore, adequate developmental testing is important to SSC success so that PMS377 officials can find and fix deficiencies at a lower cost while the SSC is still in development.



Management Comments on the Finding and Our Response

Summaries of management comments on the finding and our response are in Appendix B.

Recommendations, Management Comments, and Our Response

Recommendation 1

We recommend the Under Secretary of Defense for Acquisition, Technology, and Logistics direct the Assistant Secretary of the Navy (Research, Development, and Acquisition) to:

- a. implement a non-ship acquisition strategy for the Ship-to-Shore Connector program in accordance with DoD and Navy guidance; and
- b. review and approve testing exit criteria for the initial production decision that are in accordance with Interim DoD Instruction 5000.02, "Operation of the Defense Acquisition System," November 25, 2013.

Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics Comments

The Assistant Secretary of Defense (Acquisition), responding for the USD(AT&L), partially agreed with the recommendations. She agreed Interim DoD Instruction 5000.02 discourages concurrent development and production. However, she stated the Instruction authorizes tailoring program structure to address specific program needs including operational urgency, design maturity, and technical risk. The Assistant Secretary stated the USD(AT&L) determined the SSC acquisition approach was appropriate because of the relatively low technology development requirements and the need to address the LCAC capability gap that would begin in 2014. She stated the USD(AT&L) and the Navy established internal controls that reflect a balance between management of identified technical and program risk and the fielding timeline. She also stated the exit criteria reflected key measurable events that would indicate progress towards technical risk reduction and completion of developmental testing.

The Assistant Secretary stated that revising the program structure and exit criteria would likely break the current acquisition contract, negatively impact the industrial base, and worsen the capability gap. She stated the USD(AT&L) staff will continue to monitor the SSC program status through quarterly program office reporting and periodic Defense Acquisition Executive Summary meeting reviews. In addition, she stated the USD(AT&L) staff will monitor the developmental testing progress.

The Assistant Secretary stated the Navy was satisfactorily mitigating the identified design integration and program risks. She further stated the Navy was on track to meet the established entrance and exit criteria associated with conducting the initial production review planned for February 2015.

Our Response

The response from the Assistant Secretary of Defense (Acquisition) did not address the specifics of the recommendations. The USD(AT&L) decision to tailor and defer most of the developmental testing placed the program at risk of discovering significant deficiencies during initial production. While Interim DoD Instruction 5000.02 authorizes Milestone Decision Authorities to tailor regulatory requirements and acquisition procedures to address specific program needs including operational urgency, design maturity, and technical risk, the tailored SSC acquisition strategy does not demonstrate that PMS377 officials have addressed these specific program needs before SSC enters initial production.

- ~~(FOUO)~~ Operational Urgency: The SSC acquisition strategy stated the need to fill the LCAC capability gap; however, it did not state that the need was urgent. The acquisition decision memorandum for the system development phase did not state the Navy had an urgent operational need. Additionally, we saw no references in the SSC system development contract that it was issued to meet an urgent need.
- Design Maturity: Responding to a draft of this report, the ASN(RD&A) stated PMS377 officials successfully held a design review in September 2014 to evaluate SSC design maturity. This review should have confirmed that system design is stable and expected to meet operational requirements. The design review, however, was not a substitute for adequate developmental testing, which verifies design risks are minimized and operational requirements can be met before the initial production decision.
- ~~(FOUO)~~ Technical Risk: PMS377 officials identified three moderate technical risks to the SSC program; but these moderate risks have significant to severe consequences to program cost, schedule, and performance if they occur. Additionally, PMS377 officials have not performed adequate developmental testing to determine if these risks will be lowered before the initial production decision planned for February 2015.

The Assistant Secretary stated that SSC requires low technology development; however, all SSC components are new and some have not been used in a marine environment. PMS377 officials planned for minimal component and no production representative craft testing before the initial production decision. The PMS377 officials' plan will not provide the test data needed to verify SSC performance and minimize design risks. Interim DoD Instruction 5000.02 emphasizes the importance of the initial production decision. It states once a program commits to production, it is expensive and difficult to reverse that decision. Early developmental testing is critical because PMS377 officials could find and fix design deficiencies at lower costs while the system is still in development.

The Assistant Secretary did not agree with revising the SSC ship program acquisition strategy and exit criteria. However, the SSC program does not meet the DoD and Navy's characteristics of a ship. By using a ship acquisition strategy to develop a major defense acquisition program that did not meet the characteristics of a ship, PMS377 officials and the Milestone Decision Authority put the Navy at risk of discovering significant SSC deficiencies after production begins. Late discovery of design and integration problems could delay SSC deployment and increase the capability gap.

~~(FOUO)~~ While the Assistant Secretary stated the Navy is on track to meet the system development phase exit criteria, we disagree that the testing exit criteria are specific and demonstrable. Interim DoD Instruction 5000.02 requires specific exit criteria that program offices must achieve before proceeding into the next acquisition phase. Initiating first article testing does not require a level of demonstrated performance or completion of specific events, and therefore, does not provide adequate test data to evaluate SSC performance. We request the USD(AT&L) reconsider his position on the recommendations and provide additional comments in response to the final report.

Recommendation 2

We recommend Program Manager, Amphibious Warfare Program:

- a. manage the Ship-to-Shore Connector as a non-ship major defense acquisition program in accordance with DoD and Navy guidance;**

Department of the Navy Comments

The ASN(RD&A), responding for Program Manager, Amphibious Warfare Program, disagreed, and stated the Navy was properly managing the SSC program. He stated the USD(AT&L) approved the SSC acquisition approach, which was tailored to the air-cushioned water-to-land capability need. He also stated Interim DoD Instruction 5000.02 authorizes Milestone Decision Authorities to

tailor regulatory requirements and acquisition procedures to more efficiently achieve program objectives, consistent with statutory requirements and DoD Directive 5000.01.

(FOUO) The ASN(RD&A) stated the SSC classification as either ship or non-ship program was not relevant. He stated PMS377 officials planned limited concurrent SSC development and production to achieve program objectives more efficiently and begin initial production before completing production representative craft testing. Additionally, he stated delaying production would increase the air-cushioned water-to-land craft capability gap or require additional LCAC sustainment funding. Furthermore, he stated PMS377 officials planned the SSC limited concurrency to

He also stated that the costs incurred by the Navy due to concurrency would be significantly less than the cost of delaying production until after completion of the production representative craft testing. He stated the costs of delaying production would include the costs related to a 3-year production break by the contractor and the significantly increased LCAC sustainment costs.

Our Response

(FOUO) The response did not address the specifics of the recommendation. We agree that Interim DoD Instruction 5000.02 allows Milestone Decision Authorities to tailor regulatory requirements and acquisition procedures to meet specific program needs. However, PMS377 officials, with the USD(AT&L) approval, tailored the program so that adequate developmental testing would not be completed before the initial production decision. Specifically, PMS377 officials did not plan to complete component testing of the top SSC technical risks, production representative craft testing, or adequate reliability testing before the initial production decision planned for February 2015. PMS377 officials did

Developmental testing should be used to determine whether operational requirements can be met and should occur before initial production. Furthermore, without adequate reliability testing, the Navy could encounter serious implications to the SSC operational suitability and long-term sustainment costs.

(FOUO) We disagree with the ASN(RD&A) response that the SSC acquisition classification was not relevant. The classification played an important role in how the Navy structured the SSC acquisition. PMS377 officials' use of a ship acquisition strategy allowed for significant developmental testing to occur after the initial production decision. By using a ship acquisition strategy to develop the SSC program, PMS377 officials put the Navy at risk of discovering significant SSC deficiencies after production begins.

(FOUO) We disagree that PMS377 officials' concurrent developmental testing and production plan is minimal. PMS377 officials plan to execute the contract options for seven craft at a cost of \$ [REDACTED] before completing developmental testing of the production representative craft. The seven craft represent about 10 percent of the total procurement quantity. The officials' plan poses a risk that design and integration deficiencies found during production may require the Navy to make substantial and costly modifications to seven SSC craft already being built. While the ASN(RD&A) stated that delaying SSC production would increase the air-cushioned water-to-land craft capability gap or require additional LCAC sustainment funding, the Navy did not perform a cost-benefit analysis to support these statements. Further, late discovery of design and integration problems could both delay SSC deployment to the warfighter and increase the capability gap. Adequate developmental testing before production is critical to SSC success. Additionally, the Navy did not perform a cost-benefit analysis to substantiate the cost savings resulting from the contract options versus rework costs resulting from concurrent development and production. Based on the information provided for our review, the Navy cannot be certain of any cost savings. We request the Program Manager reconsider his position on the recommendation and provide additional comments to the final report.

- b. complete developmental testing of the production representative craft to verify the Ship-to-Shore Connector can meet all operational requirements before the initial production decision and before the exercise of contract options; and**

Department of the Navy Comments

(FOUO) The ASN(RD&A), responding for Program Manager, Amphibious Warfare Program, disagreed with the recommendation. He stated the developmental testing schedule and initial production decision were structured to attain the lowest cost to the Government. He stated the fixed price contract for the production representative craft and craft 1 through 8 were key to the program's affordability. He also stated breaking the contract and disrupting the production line would cost DoD more than the potential rework cost due to concurrency. The ASN(RD&A) stated [REDACTED]

[REDACTED] He added the Navy budgeted for concurrency rework and included these costs in the system development program life cycle cost estimate and service cost position.

The ASN(RD&A) stated the SSC concurrency risk and associated costs are low due to a mature SSC design learned from more than 30 years of LCAC experience. Before the system development phase, PMS377 officials incorporated LCAC lessons learned into the SSC design and integrated and tested full-scale SSC component and system prototypes on the LCAC. The officials held successful critical design and production readiness reviews in September 2014. The Naval Sea Systems Command Chief Engineer stated the SSC design was mature, and, as a result of the successful production readiness review, production of craft 1 began in mid-November 2014. The ASN(RD&A) stated the SSC design maturity, material and component availability, and industry ability were evaluated before the start of craft production. PMS377 officials decreased the risk that problems will be discovered during developmental testing.

The ASN(RD&A) stated the contractor used improved production methods compared to the LCAC and reduced the risk of flaws going undiscovered. He stated that improved production methods will ensure better accuracy of component manufacturing and reduce rework.

Our Response

~~(FOUO)~~ The response did not address the specifics of the recommendation. While PMS377 officials stated their concurrent development and production strategy would provide the lowest cost to the Government, they did not provide an analysis to demonstrate that this will provide the lowest cost. Further, they did not provide support showing a break in the contract would cost more than potential rework due to concurrency. While PMS377 officials budgeted for typical change order craft modifications of \$13 million for craft 2 to 8 in the program cost estimates, their documents did not specifically identify budgeted amounts for the additional risk of concurrency. PMS377 officials' concurrency plan poses additional risk that design and integration deficiencies found during production may require significantly more money than what PMS377 officials budgeted.

While the ASN(RD&A) stated that concurrency risk and associated costs are low due to 30 years of LCAC experience, we disagree that LCAC experience is an indicator of a low risk SSC program. All SSC components are new and some have not been used in a marine environment. However, PMS377 officials planned for minimal component and no production representative craft testing before the initial production decision. The ASN(RD&A) statements regarding lessons learned and LCAC prototype testing were key factors supporting SSC entry into the system development phase. However, LCAC prototype testing [REDACTED]

[REDACTED] Although the ASN(RD&A) stated PMS377 officials successfully held

technical reviews in September 2014, these reviews are regulatory requirements, not substitutes for adequate development testing of major components and a production representative craft before the initial production decision. The ASN(RD&A) stated that improved production methods will ensure better accuracy of component manufacturing and reduce rework. However, PMS377 [REDACTED]

[REDACTED] We request the Program Manager reconsider his position on the recommendation and provide additional comments to the final report.

- c. revise testing exit criteria for the initial production decision to be specific and demonstrable.**

Department of the Navy Comments

The ASN(RD&A), responding for Program Manager, Amphibious Warfare Department, disagreed with the recommendation. He stated the USD(AT&L) approved specific and demonstrable exit criteria—the initiation of the gearbox first article test, shafting first article test, and main engine certification testing. The ASN(RD&A) stated that before first article tests can begin, the component must demonstrate design and production maturity. Additionally, manufacturers must complete first article test plans that the Navy must approve. He stated that first article test plans include specific and demonstrable exit criteria.

Our Response

The response did not address the specifics of the recommendation. The USD(AT&L) approved exit criteria for testing that did not require successful completion of gearbox, shafting, and main engine certification testing. Interim DoD Instruction 5000.02 requires specific exit criteria that program offices must achieve before proceeding into the next acquisition phase. Although the completion of first article test plans is specific and demonstrable, PMS377 officials' initiation of first article testing does not require a level of demonstrated performance or completion of specific events. We request the Program Manager reconsider his position on the recommendation and provide additional comments to the final report.

Management Comments on the Internal Controls and Our Response

Department of the Navy Comments

The ASN(RD&A) disagreed that the Navy had an internal control weakness regarding management of the SSC acquisition program. He stated the USD(AT&L) approved the SSC for entry into the system development phase in accordance with DoD Instruction 5000.02. The Instruction authorizes Milestone Decision Authorities to tailor the regulatory information requirements and acquisition procedures to achieve cost, schedule, and performance goals. The ASN(RD&A) stated the SSC program complied with the USD(AT&L) Memorandum, "Better Buying Power: Guidance for Obtaining Greater Efficiency and Productivity in Defense Spending," September 14, 2010. PMS377 officials ensured economical production rates for the SSC and set shorter program timelines.

~~(FOUO)~~ The ASN(RD&A) stated producing [REDACTED]
[REDACTED]

He also stated the contract option for craft 4–8 are planned to substantially reduce the contract target price compared to the production representative craft and craft 1–3. The ASN(RD&A) stated the risk and cost impact of concurrent developmental testing and production is low because the Navy and contractor are experienced and the SSC design is mature. He stated the savings from production efficiencies and reduced SSC sustainment costs will more than offset the cost to fix any design and integration deficiencies found during production. Additionally, the ASN(RD&A) stated the SSC program structure will minimize the craft capability gap, whereas delaying initial production until after completion of the production representative craft testing would severely worsen the capability gap.

The ASN(RD&A) stated PMS377 officials developed the SSC program strategy in a DoD Instruction 5000.02-compliant series of meetings, Gate Reviews, and USD(AT&L) program reviews lasting more than 2 years. The SSC program strategy reflected input and approval from his office, the Navy Program Executive Office Ships, the SSC Overarching Integrated Product Team, and the USD(AT&L). The SSC program strategy reflected the consensus among these diverse offices on the most cost-effective way to produce and deliver the SSC.

Our Response

~~(FOUO)~~ Although the SSC program strategy reflected input and approval from numerous DoD offices, an internal control weakness still existed. Office of Management and Budget Circular No. A-123, "Management's Responsibility for Internal Control," December 21, 2004, states management is responsible for establishing and maintaining internal controls to achieve effective and efficient operations, reliable financial reporting, and compliance with applicable laws and regulations. Interim DoD Instruction 5000.02 states program offices should develop, build, and test a system to verify that all operational requirements have been met before initial production. Successful completion of adequate testing with a production representative craft will normally be the primary basis for entering initial production. PMS377 officials planned the initial production decision for February 2015 before completing the production representative craft testing and the USD(AT&L) approved that decision, which did not follow Interim DoD Instruction 5000.02. While the ASN(RD&A) stated the savings from production efficiencies and reduced SSC sustainment costs will more than offset the cost to fix any design and integration deficiencies found during production, the Navy cannot be certain of the cost savings because they did not provide a cost-benefit analysis to substantiate their strategy.

Appendix A

Scope and Methodology

We conducted this performance audit from April 2014 through November 2014 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.

We interviewed personnel from the following offices either responsible for, or participating in, preparing and managing the SSC program for initial production: Under Secretary of Defense for Acquisition, Technology, and Logistics, Arlington, Virginia; Director, Operational Test & Evaluation, Alexandria, Virginia; Assistant Secretary of the Navy (Research, Development, and Acquisition), Arlington, Virginia; Amphibious Warfare Program, PMS377, Washington Navy Yard, D.C.; Naval Sea Systems Command, Washington Navy Yard, D.C.; and Commander Operational Test and Evaluation Force, Norfolk, Virginia.

We reviewed documents that PMS377 officials used to prepare the SSC program for the initial production decision planned for February 2015. We collected, reviewed, and analyzed documents from June 2010 through August 2014. We reviewed:

- Contract Data Requirements List Submission History, August 29, 2014;
- ~~(FOUO)~~ Milestone C Exit Criteria Tracker, August 21, 2014;
- ~~(FOUO)~~ SSC Defense Acquisition Executive Summary, June 2, 2014;
- ~~(FOUO)~~ Navy Program Delegation Decisions Acquisition Decision Memorandum, July 24, 2012;
- ~~(FOUO)~~ Ship to Shore Connector Milestone B Acquisition Decision Memorandum, July 5, 2012;
- ~~(FOUO)~~ SSC Acquisition Program Baseline, July 5, 2012;
- ~~(FOUO)~~ Acquisition Strategy for the Ship to Shore Connector (SSC), Revised June 26, 2012;
- ~~(FOUO)~~ SSC Systems Engineering Plan (SEP), April 27, 2012;
- ~~(FOUO)~~ SSC Test and Evaluation Master Plan Number 1792, Rev 1, February 2012;

- Office of the Director of Defense Research and Engineering Memorandum, “Ship to Shore Connector (SSC) Milestone B Technology Readiness Assessment (TRA)”, January 3, 2011; and
- ~~(FOUO)~~ Ship to Shore Connector Capability Development Document, June 10, 2010.

To determine whether the Navy effectively prepared and managed the SSC program for initial production, we reviewed program planning and reporting documentation against the policies and guidance in the following DoD and Navy issuances:

- DoD Directive 5000.01, “The Defense Acquisition System,” November 20, 2007;
- Interim DoD Instruction 5000.02, “Operation of the Defense Acquisition System,” November 25, 2013;
- Secretary of the Navy Instruction 5000.02E, “Department of the Navy Implementation and Operation of the Defense Acquisition System and the Joint Capabilities Integration and Development System,” September 1, 2011;
- Secretary of the Navy Instruction 5030.8B, “General Guidance for the Classification of Naval Vessels and Battle Force Ship Counting Procedures,” March 7, 2014;
- DoD Test and Evaluation Management Guide, December 2012;
- Naval Sea Systems Command Technical Publication S9800-AC-MAN-010, “Ship Design Manager (SDM) and Systems Integration Manager (SIM) Manual,” February 13, 2012;
- Naval Sea Systems Command, “Supervisors of Shipbuilding, Conversion and Repair (SUPSHIP) Operations Manual,” September 29, 2008; and
- Naval Sea Systems Command S9094-AE-GYD-010, “Total Ship Test Program Surface Ship Post-Delivery Tests and Trials Guidance Manual,” January 2001.

Use of Computer-Processed Data

We did not use computer-processed data to perform this audit.

Use of Technical Assistance

A DoD Office of Inspector General Technical Assessment Directorate engineer reviewed [REDACTED] and other program documents. The engineer accompanied the audit team on the site visit to the PMS377 office, at Washington Navy Yard, D.C.; and Pentagon, Arlington, Virginia.

Prior Coverage

During the last 5 years, the Government Accountability Office (GAO) issued six reports discussing the Ship-to-Shore Connector. Unrestricted GAO reports can be accessed at <http://www.gao.gov>.

GAO

Report No. GAO-14-340SP, "DEFENSE ACQUISITIONS Assessments of Selected Weapon Programs," March 2014

Report No. GAO-13-294SP, "DEFENSE ACQUISITIONS Assessments of Selected Weapon Programs," March 2013

Report No. GAO-13-103, "WEAPONS ACQUISITION REFORM Reform Act Is Helping DOD Acquisition Programs Reduce Risk, but Implementation Challenges Remain," December 2012

Report No. GAO-12-400SP, "DEFENSE ACQUISITIONS Assessments of Selected Weapon Programs," March 2012

Report No. GAO-11-502, "DOD WEAPON SYSTEMS Missed Trade-off Opportunities During Requirements Reviews," June 2011

Report No. GAO-11-233SP, "DEFENSE ACQUISITIONS Assessments of Selected Weapon Programs," March 2011

Appendix B

Management Comments on the Finding and Our Response

Department of the Navy Comments

~~(FOUO)~~ The Assistant Secretary of the Navy (Research, Development, and Acquisition) (ASN[RD&A]), responding for the Program Manager, Amphibious Warfare Program, disagreed with the findings. He stated the best opportunity to improve reliability is during the design process and the Navy removed or reduced the top LCAC maintenance drivers during the SSC design process. In addition, he stated PMS377 officials evaluated craft reliability during detail design development. The ASN(RD&A) stated PMS377 officials have sufficient reliability data to support an initial production decision and approved the contractor's craft-level reliability, availability, and maintainability analysis report. He had high confidence the contractor's predictions in the report were accurate.

The ASN(RD&A) stated the SSC had a robust developmental test program during the production phase. He stated main engine certification testing in October 2014 marked the beginning of reliability growth testing. He added reliability growth testing will continue throughout SSC production representative craft construction. The ASN(RD&A) indicated the contractor was required to perform environmental tests on critical SSC components, first article tests on systems which differ from LCAC, and factory acceptance tests of critical components. The ASN(RD&A) expected these developmental tests to provide substantial information about component reliability, which he believed was a significant determinant of overall craft reliability.

~~(FOUO)~~ The ASN(RD&A) stated the acquisition decision memorandum for the system development phase established a phased approach with the initial production decision authorizing construction of craft 2 and 3 and additional exit criteria required before contract award of craft 4 through 8. He stated the phased approach was intended to sufficiently reduce the concurrency risk of developmental testing during production representative craft construction. He stated the phased approach with the award of craft 2 and 3 in FY 2015 and craft 4 through 8 in FY 2016 is expected to result in contract options at a price favorable to the Government. He added the expected price per craft was \$ [REDACTED] for craft 1, \$ [REDACTED] for craft 2 and 3, and \$ [REDACTED] for craft 4 through 8. The ASN(RD&A) stated these prices will more than offset change order costs from concurrency.

Our Response

(FOUO) The ASN(RD&A) stated the best opportunity to improve reliability is during the design process and the Navy removed or reduced the top LCAC maintenance drivers during the SSC design process. However, [REDACTED]

[REDACTED] Furthermore, PMS377 officials stated they needed the contractor's reliability data to assess reliability improvement and that the Navy would use testing to assess reliability. However, [REDACTED]

[REDACTED] As of December 11, 2014, PMS377 officials had not approved the reliability, availability, and maintainability program plan submitted by the contractor. Additionally, the contractor planned to resubmit the failure mode, effects, and criticality analysis report for further review and approval prior to the initial production decision in February 2015.

(FOUO) Although the ASN(RD&A) expects the contractor to perform developmental tests to provide substantial information about component reliability, the contractor developmental test results will not be available at the initial production decision planned for February 2015. Also, PMS377 officials' initiation of reliability component testing at the initial production decision does not provide adequate data to support a low-risk decision and verify SSC can meet reliability goals. Further, representatives from the Office of the DASD(DT&E) expressed concern over SSC reliability and stated component reliability does not mean high craft reliability. Although the ASN(RD&A) stated he had high confidence the contractor's predictions in the report were accurate, the contractor's predictions were not real test results.

We agree PMS377 officials planned significant developmental testing activities during the production phase. However, most of the developmental testing activities should have been conducted before the SSC entered the initial production phase. PMS377 officials may discover design and integration problems later during the production that may require them to make substantial and costly modifications to craft already being built. Late discovery of design and integration problems could delay SSC deployment and increase the capability gap.

(FOUO) We acknowledge the acquisition decision memorandum for the system development phase required additional exit criteria prior to contract award of craft 2 and 3 and craft 4 through 8. Although the ASN(RD&A) believed the phased approach and additional required exit criteria would reduce the concurrency risk, this approach does not address not completing component and production representative craft testing at the initial production decision. PMS377 officials'

(FOUO) plan does not verify all operational requirements have been met before initial production. Additionally, the Navy did not perform a cost-benefit analysis to substantiate the cost savings resulting from awarding the contract options versus rework costs resulting from concurrent development and production.

Department of the Navy Comments—Corrections and Clarifications

The Navy provided corrections and clarifications on specific statements in the report.

Our Response

We reviewed the Navy's comments and made changes as appropriate.

Management Comments

Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics

Final Report
Reference



ASSISTANT SECRETARY OF DEFENSE
30150 DEFENSE PENTAGON
WASHINGTON, DC 20301-3015

DEC 15 2014

MEMORANDUM FOR PROGRAM DIRECTOR FOR ACQUISITION, PARTS, AND
INVENTORY, OFFICE OF THE INSPECTOR GENERAL

THROUGH: DIRECTOR, ACQUISITION RESOURCES AND ANALYSIS *7/2/16/14*

SUBJECT: Response to DoD Office of the Inspector General Draft Report on Actions to The Navy
Has Not Effectively Prepared the Ship to Shore Connector for Initial Production (Project
No. D2014-D000AU-0172.000)

As requested, I am providing responses to the general content and recommendations
contained in the subject report.

Recommendation:

We recommend the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)) direct the Assistant Secretary of the Navy (Research, Development, and Acquisition) to: **a)** implement a non-ship acquisition strategy for the Ship to Shore Connector (SSC) program in accordance with DoD and Navy guidance and **b)** review and approve testing exit criteria for the initial production decision that are in accordance with Interim DoD Instruction 5000.02, "Operation of the Defense Acquisition System," November 25, 2013.

Response:

Partially concur. While the interim DoD 5000.02 instruction discourages design/production concurrency, it does state that the structure of an acquisition program should be tailored to address the needs of the program including operational urgency, design maturity, and technical risk. The DAE deemed the SSC acquisition approach appropriate because of the relatively low technology development requirements of the craft and the need to address the anticipated operational shortfall driven by the end of service life of the Navy's Landing Craft, Air Cushion (LCAC) assets that would begin in 2014. USD(AT&L) and Navy established internal controls that reflect a balance between management of identified technical and program risk and the fielding timeline. The exit criteria developed for the Milestone (MS) C Defense Acquisition Board review reflected key measurable events that would indicate progress towards technical risk reduction and completion of developmental testing.

Reversing the MS B decisions and directing the Navy to revise the program structure and exit criteria would likely break the current acquisition contract, negatively impact the industrial base, and worsen the gap in operational LCAC assets. Although the Service Acquisition Executive is the decision making authority for the program, the USD(AT&L) staff will continue to monitor the SSC program status through quarterly program office reporting and via periodic Defense Acquisition Executive Summary meeting reviews. In particular, we will closely monitor the progress of developmental testing.

Based on our current evaluations, however, the Navy is satisfactorily mitigating the identified design integration and program risks and is on track to meet the established entrance and exit criteria associated with conducting the MS C review planned for February 2015.

Please contact [REDACTED] or [REDACTED] if additional information is required.

Katharina McFarland
Katharina McFarland

Department of the Navy

Final Report
Reference



THE ASSISTANT SECRETARY OF THE NAVY
(RESEARCH, DEVELOPMENT AND ACQUISITION)
1000 NAVY PENTAGON
WASHINGTON DC 20350-1000

DEC 11 2014

MEMORANDUM FOR PROGRAM DIRECTOR FOR ACQUISITION, PARTS, AND
INVENTORY, OFFICE OF THE INSPECTOR GENERAL

SUBJECT: Navy's Response to Department of Defense Office of the Inspector General
Draft Report dated November 13, 2014, Project No. D2014-D000AU-
0172.000, "The Navy Has Not Effectively Prepared the Ship to Shore
Connector for Initial Production"

Attached is the Navy's response to the Department of Defense Office of the
Inspector General (DoDIG) Draft Report dated November 13, 2014, Project No. D2014-
D000AU-0172.000, "The Navy Has Not Effectively Prepared the Ship to Shore
Connector for Initial Production". Included in the response are Navy's comments,
corrections/clarifications, and Security Marking Review.

My point of contact for this matter is [REDACTED] who can be
reached at [REDACTED]


Sean J. Stackley

Attachments:
As stated

Department of the Navy (cont'd)

Final Report
Reference

**Navy's Response to
Department of Defense Office of the Inspector General (DoDIG)
Draft Report dated November 13, 2014,
Project No. D2014-D000AU-0172.000**

**"The Navy Has Not Effectively Prepared the Ship-to-Shore
Connector for Initial Production."**

~~This document contains information that may be exempt from mandatory disclosure under the Freedom of Information Act.~~

~~**WARNING** - This document contains technical data whose export is restricted by the Arms Export Control Act (Title 22, U.S.C. Sec. 2751 et seq.) or the Export Administration Act of 1979, as amended, Title 30, U.S.C., App 2401, et seq. Violations of these export laws are subject to severe criminal penalties. Disseminate per the provisions of COMNAVMSG 5510.101.~~

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Department of the Navy (cont'd)

Final Report
Reference

DoDIG Recommendation: “We recommend the Program Manager, Amphibious Warfare Program:

- a. manage the Ship-to-Shore Connector as a non-ship major defense acquisition program in accordance with DoD and Navy guidance;
- b. complete developmental testing of the production representative craft to verify the Ship-to-Shore Connector can meet all operational requirements before the initial production decision and before the exercise of contract options; and
- c. revise testing exit criteria for the initial production decision to be specific and demonstrable.”

Navy Executive Summary: Non-Concur.

~~(FOUO)~~ The Navy non-concurs with the DoDIG’s recommendations and findings and firmly advocates that it has effectively prepared the Ship to Shore Connector (SSC) for the initial production decision, Milestone C. PMS 377 is executing the SSC Program of Record (POR) approved by the Undersecretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)) at Milestone B, which was tailored by USD(AT&L) in accordance with the controlling guidance, DoDI 5000.02, dated 8 December 2008, to achieve schedule and performance goals in the most cost effective manner.

~~(FOUO)~~ Cost effective and timely replacement of the Landing Craft, Air Cushion (LCAC) capability requires concurrency between developmental testing of the Test and Training (T&T) craft, LCAC 100, and production of LCAC 101-108. This concurrency is driven largely by the need to minimize the capability gap created by the retiring LCAC and to reach the SSC minimum Economic Order Quantity (EOQ) as soon as feasible in Fiscal Year 2016 (FY16). The Government will receive cost savings from producing SSC at EOQ through production efficiencies. Based on the maturity of the Navy-led design and the more than 30-years of Navy and Textron LCAC experience, costs incurred by the Government due to concurrency will be significantly less than the costs of delaying production until after completion of LCAC 100 developmental testing. Costs of delaying production would include the effects of an approximately three year production break and significantly increased LCAC sustainment costs.

The Navy has successfully executed the tailored SSC Program. It has controlled cost growth, with Average Procurement Unit Cost (APUC) and Program Acquisition Unit Cost (PAUC) remaining below Acquisition Program Baseline (APB) targets. The program has successfully executed every key event within APB thresholds. Furthermore, the program is on track to meet all Key Performance Parameters (KPPs) and Key System Attributes (KSAs) required by the SSC Capability Development Document (CDD) and the specific and demonstrable exit criteria for Milestone C specified in USD(AT&L)’s Acquisition Decision Memorandum (ADM) at Milestone B.

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The Navy non-concurs with the DoDIG's finding, "Navy has not completed adequate developmental testing on the Ship-to-Shore Connector".

~~(FOUO)~~ The best opportunity to influence and improve reliability occurs throughout the design process. During the SSC contract design, the Navy eliminated or mitigated the top 25 LCAC maintenance drivers based on decades of operational history. Additionally, PMS 377 continuously evaluated craft reliability throughout detail design development as subsystems were allocated reliability targets by reviewing subcontractor deliverables and incorporating necessary changes as the design matured. As a result, the reliability data to date provides sufficient information to support a Milestone C decision, and the Government has approved Textron's craft level Reliability, Availability and Maintainability (RAM) analysis report. Source data for the analysis included, but was not limited to, fielded material history of the same or comparable equipment, test results, vendor information, and databases. The report's results indicate that the program is meeting or exceeding the thresholds for Material Availability (A_M), Material Reliability (R_M), Operational Availability (A_O), and Mean Time To Repair (MTTR) from the CDD. The Navy has a high confidence that Textron's predictions in the approved craft RAM analysis report are accurate.

The SSC Program has a robust developmental test program during production. The start of Main Engine Naval Vessel Rules (NVR) testing in October 2014 marked the beginning of reliability growth testing, which will continue throughout LCAC 100 production. Textron is required to perform environmental tests on critical SSC components, first article tests on systems which differ from LCAC, and factory acceptance tests are specified for critical components. These developmental tests will provide substantial information about component reliability, which is a significant determinant of overall craft reliability.

USD(AT&L)'s Milestone B ADM sets forth specific and demonstrable developmental testing exit criteria for Milestone C, including initiation of the gearbox first article test, the shafting first article test, and main engine NVR certification testing. Initiation of a first article test requires specific predecessors demonstrating design and production maturity. In order to hold a first article test, the design for the system must be complete as well as the construction drawings. These construction drawings must be of sufficient quality to produce a first article test unit, which must be production representative to support testing by the manufacturer. In order to conduct the first article tests, manufacturers must complete first article test plans with specific exit criteria and receive approval from the Government.

~~(FOUO)~~ The ADM establishes a phased approach in which Milestone C authorizes the production of LCAC 102-103, with additional exit criteria that must be met prior to further investment and award of LCAC 104-108. This also ensures that developmental testing

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during LCAC 100 construction will steadily and sufficiently reduce concurrency risk. Furthermore, early craft production ~~DoD OIG (b) (4)~~

~~DoD OIG (b) (4)~~ which is not a risk. This phased approach, with award of LCAC 102-103 in FY15 and LCAC 104-108 in FY16, enables Textron to reach EOQ as soon as possible and resulted in priced options extremely favorable to the Government. The target price per craft drops from \$~~DoD OIG (b) (4)~~ for LCAC 101 and \$~~DoD OIG (b) (4)~~ for LCAC 102-103, to \$~~DoD OIG (b) (4)~~ for LCAC 104-108. These savings will more than offset change order costs incurred from concurrency.

DoDIG Recommendation 2a: "We recommend Program Manager, manage the Ship-to-Shore Connector as a non-ship major defense acquisition program in accordance with DoD and Navy guidance;"

Navy's Response to Recommendation 2a: Non-Concur.

The Navy is managing the SSC Program as an appropriately tailored major defense acquisition program

PMS 377 is executing the SSC program according to an approach approved by USD(AT&L), in accordance with current guidance, and tailored to the specific needs of the LCAC replacement program. Interim DoDI 5000.02 "authorizes Milestone Decision Authorities (MDAs) to tailor the regulatory requirements and acquisition procedures in this instruction to more efficiently achieve program objectives, consistent with statutory requirements and [DoD Directive 5000.01]."

~~(FOUO)~~ Classifying SSC as either a ship or non-ship program is inapposite. The reasoning for the SSC Program's limited concurrency was not whether it was a shipbuilding program but whether it would achieve program objectives more efficiently than delaying initial production until after completion of testing on LCAC 100. Under the current SSC procurement profile, the LCAC/SSC inventory will still fall to a low of 55 craft in FY19, 18 craft below the 73 craft requirement in the SSC CDD. Delaying production would either increase the capability gap or require an increase in LCAC sustainment funding. Additionally, the SSC minimum EOQ is ~~DoD OIG (b) (4)~~ craft per year, informed by Broad Agency Announcement (BAA) responses from industry. Limited concurrency is necessary to reach minimum EOQ in FY16 and benefit from the accompanying production efficiencies.

DoDIG Recommendation 2b: "We recommend Program Manager, complete developmental testing of the production representative craft to verify the Ship-to-Shore Connector can meet all operational requirements before the initial production decision and before the exercise of contract options; and"

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Navy's Response to Recommendation 2b: Non-Concur.

The developmental testing schedule and initial production decision date are structured to achieve the lowest cost to the Government.

~~(FOUO)~~ Key to the program's affordability approach is the competitively negotiated Fixed Price Incentive Firm (FPIF) contract for the T&T craft and LCAC 101-108, as is the ability to maintain an efficient and effective production line. Breaking the competitively negotiated FPIF contract and disrupting the production line would cost the Department of Defense substantially more than the cost of potential rework due to concurrency. Not only would waiting to begin construction of LCAC 102-103 after LCAC 100 developmental testing completes delay reaching EOQ, but it would also create an approximately three year production break during which Textron would have to lay off employees, thereby losing learning gained during LCAC 100-101 construction. The program has budgeted for rework due to concurrency and the costs were included in the Milestone B Program Life Cycle Cost Estimate (PLCCE) and Service Cost Position (SCP).

The SSC Program's concurrency risk and accompanying costs are low due to the mature design informed by more than 30 years of LCAC experience. Prior to Milestone B, the contract design incorporated lessons learned from LCAC production and operation. Full scale SSC component and system prototypes were integrated into an LCAC craft and tested in an SSC-like operational environment. As a result, SSC has only one Critical Technology Element, Propelled Extinguishing Agent Technology (PEAT), which the Office of Naval Research (ONR) rated as having a Technology Readiness Level (TRL) of 8. The program successfully held the Critical Design Review (CDR) and Production Readiness Review (PRR) in September 2014. The NAVSEA Chief Engineering (CHENG) stated that the SSC design was mature and approved the SSC product baseline, and, as a result of the successful PRR, production for LCAC 100 began mid-November. The craft's design maturity and readiness, the availability of materials and components, and industry's ability to successfully start and sustain fabrication were all closely evaluated. By using state of the practice technology, the program has decreased the risk that problems will be uncovered during developmental testing.

~~(FOUO)~~ Textron is using improved production methods compared to LCAC, reducing the risk of flaws going undiscovered and impacting multiple craft. ~~DoD OIG: (b) (4)~~
~~DoD OIG: (b) (4)~~ were purchased or constructed to ensure better accuracy of component and sub-assembly efforts. Textron utilizes ~~DoD OIG: (b) (4)~~
~~DoD OIG: (b) (4)~~ execution and inspection. Products not within tolerance are identified as defects and will be rejected or corrected prior to use on SSC. Defect tracking will be in place for SSC similar to processes used by Textron on other product lines. These improved production methods will reduce rework compared to LCAC.

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DoDIG Recommendation 2c: "We recommend Program Manager, revise testing exit criteria for the initial production decision to be specific and demonstrable."

Navv's Response to 2c: Non-Concur.

Testing exit criteria approved by USD(AT&L) for Milestone C are specific and demonstrable.

Initiation of the gearbox first article test, the shafting first article test, and main engine Naval Vessel Rules (NVR) certification testing are specific and demonstrable. Initiation of first article tests requires specific predecessors demonstrating design and production maturity. In addition, to conduct the first article test, manufacturers must complete first article test plans and receive approval from the Government. Submitted test plans for the three critical components include specific and demonstrable exit criteria including, but not limited to:

- ~~(FOUO)~~ Gearbox
 - Lubrication oil leaving gearbox may not exceed 200F.
 - Lubrication oil does not leak from gearbox at a rate greater than 30 cubic centimeters per hour
- ~~(FOUO)~~ Shafting
 - Maximum defect size cannot exceed 1.00 square inches
 - Small, isolated defect areas cannot exceed 3% of the inspected area
 - When two or more isolated defects are located close together, the separation between them must be 0.7 inches or greater.
 - Sections of composite torque tube within 8 inches of the metal/composite joint bond structure cannot contain defects greater than 0.5 square inches.
- ~~(FOUO)~~ Main Engine NVR Certification
 - Under steady state conditions, N1 fluctuations between idle and 12,000 rpm cannot exceed ± 110 rpm. For speeds above 12,000 rpm, N1 fluctuations cannot exceed ± 70 rpm. For N2, fluctuations cannot exceed ± 25 rpm with an eddy current dyne.
 - Vibration cannot exceed 2.5 inches per second Root Mean Square (RMS) during Start, 3.0 in./sec. RMS during Transient, and 1.5 in./sec. during Steady State.

Thus, the approved test plans will have specific and demonstrable exit criteria vendors must meet, which will ensure component reliability.

Comment: USD(AT&L)'s approval of the SSC POR at Milestone B was not the result of an internal control weakness.

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The SSC Milestone B decision was fully compliant with DoDI 5000.02, which, “[c]onsistent with statutory requirements and [DoD Directive 5000.01], authorizes Milestone Decision Authorities (MDAs) to tailor the regulatory information requirements and acquisition process procedures in this Instruction to achieve cost, schedule, and performance goals.” The SSC POR was also in accordance with the Better Buying Power (BBP) 1.0 initiative. The USD(AT&L) Memorandum, “Better Buying Power: Guidance for Obtaining Greater Efficiency and Productivity in Defense Spending,” dated 14 September 2010, provided guidance on implementation of BBP. One of BBP 1.0’s focus areas was to target affordability and control cost growth. Two recommended methods to do so were to “[m]ake production rates economical and hold them stable” and to “[s]et shorter program timelines and manage to them.”

~~(FOUO)~~ Starting production on LCAC 102-103 in FY15 is necessary to provide an efficient ramp up to the SSC EOQ of ^{DoD}~~DoD~~ craft in FY16. The FY16 contract option for LCAC 104-108 has a substantial reduction in target price compared to LCAC 100-103 and producing at least ^{DoD}~~DoD~~ craft annually will control costs. Due to the Navy and Textron’s LCAC experience as well as the SSC’s design maturity, the risk and cost impact of concurrency is low. This cost will be more than offset by savings from production efficiencies and reduced SSC sustainment costs compared to LCAC. Additionally, the SSC POR structure will minimize the LCAC/SSC capability gap whereas delaying initial production until after completion of LCAC 100 testing would exacerbate it severely. The SSC POR structure is best suited to meeting the needs of the Navy and Department of Defense.

The SSC POR was developed in a DoDI 5000.02-compliant series of meetings, Gate Reviews, and USD(AT&L) Program Reviews lasting more than two years. It reflects input and approval from numerous parties, including PEO Ships, the Assistant Secretary of the Navy for Research, Development and Acquisition (ASN(RD&A)), the SSC Overarching Integrated Product Team (OIPT), and USD(AT&L). The current POR reflects the consensus among these diverse parties on the most cost effective way to produce and deliver the SSC.

Conclusion:

~~(FOUO)~~ USD(AT&L) approved the SSC POR at Milestone B in compliance with DoDI 5000.02, tailoring the program to minimize the LCAC/SSC capability gap and to reach the SSC minimum EOQ as soon as feasible. The Navy and PMS 377, with over 30-years of LCAC experience, are successfully executing the SSC POR, with all cost, schedule, and performance parameters within APB targets. Accordingly, PMS 377 rejects DoDIG’s finding and recommendations and will continue to seek a Milestone C decision in February 2015, to authorize production for LCAC 102-103.

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Corrections and Clarifications:

"However, as of August 2014, PMS377 officials did not expect to complete first article test plans until July 2015, approximately 5 months after the planned initial production decision" (p. 6).

Deleted

~~(FOUO)~~ First article test plans will be finished in January 2015 upon completion of the propeller first article test plan. An excerpt of the Textron Integrated Master Schedule (IMS) reflecting that was provided to DoDIG on November 7, 2014. Of the eight first article test plans for Milestone C, the propeller test plan was the only one previously projected to complete after Milestone C. PMS 377 worked with Textron to ensure propeller design maturity would be sufficient to complete the test plan by Milestone C in February 2015.

"PMS377 officials determined software was a risk area because the contractor needed to develop over 669,000 lines of new software code, according to a Government Accountability Office (GAO) report from March 2013" (p. 7).

Revised, Page 7

This quote reflects a misunderstanding of the GAO report which stated, "Officials estimated that the subcontractor will have to develop over 669,000 lines of new code and the program office has identified software development as a risk area." Software is a risk area not because of the number of lines of code, but because of the inherent nature of software development and the challenge presented with integrating all the craft subsystems into an operating system that will allow the crew to operate the craft. Hence the reason for the significant importance placed on monitoring software development and the prudent nature of managing the risk. Furthermore, current software development estimates include 150,000 new lines of code and 165,000 reused lines of code, for a total of approximately 315,000 lines of code. This information was briefed during DoDIG's site visit to Washington, D.C., in June 2014.

DoD OIG: (b) (4)

 (p. 9).

Revised, Page 9

~~(FOUO)~~ Textron's submittal history for reliability Contract Data Requirements Lists (CDRLs) to date was provided to DoDIG on August 29, 2014. Textron provided the initial submittal of each reliability CDRL to the Government by the contractual due date. Accordingly, the "Days Past Due" column of Table 2 is mislabeled. It is true that the Navy did not approve any of these initial submissions; however, the purpose of submissions so soon after contract award in July 2012 was to evaluate the adequacy of Textron's reliability analysis process. Textron submitted and the Navy provided feedback on numerous additional submissions of each reliability CDRL over the next two years.

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Final approval of these CDRLs is dependent upon the high level of design maturity reached at the time of the CDR. The Navy approved the first of these CDRLs, the Craft Level RAM Analysis Report, on October 17, 2014.

"PMS377 officials could not provide additional information for the remaining two contract deliverables" (p. 10).

Deleted

~~(FOUO)~~ Textron resubmitted its RAM Program Plan on October 20, 2014, and it is currently in Navy review. Textron will resubmit its Failure Mode, Effects and Criticality Analysis (FMECA) Report on January 9, 2015. These statuses were provided to DoDIG on November 7, 2014.

"The first opportunity PMS377 officials will have to discover craft reliability design and integration deficiencies will occur during contractor testing of the production representative craft, about 2 years after the SSC entered initial production (p. 10)."

Revised, Page 10

As stated the Test and Evaluation Master Plan (TEMP) approved at Milestone B, the reliability growth strategy leverages equipment, integrated, and craft-level testing throughout craft construction. Equipment level testing serves to identify design weaknesses early in the program. Many SSC systems are composed predominately of legacy components, which have demonstrated levels of reliability. Thus, while full level of craft reliability will not be known before contractor trials, production testing will provide early warning signals as to whether RAM critical equipment and primary reliability drivers (main engines, propulsion subsystems, C4N hardware and software, auxiliary and electrical power generation subsystems), and therefore the craft as a whole, are attaining the required level of reliability growth.

"According to the DoD Developmental Test and Evaluation annual report from March 2013, PMS377 officials indicated it would cost \$15 million to delay the contract option for craft 2 and 3 after March 31, 2015 (p. 13)."

Revised, Page 12

The \$15M cost to delay LCAC 102 and 103 was briefed to the pre-MS B OIPT in January 2012, and at Milestone B, the decision was made not to delay the option exercise. This estimate was based on a 6-12 month delay in option exercise, not the approximately three year delay proposed by DoDIG. The cost of a three year delay would be substantially higher due to impact to the industrial base (risk of damage, degradation, and loss of existing tooling, facilities, and finished components as well as loss of experienced personnel) and increased requirements for LCAC sustainment.

"In 2013, DASD(DT&E) launched an initiative to shift more developmental testing to the system development phase before committing to production. DASD(DT&E) advocated test

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strategies and plans that ensured rigorous developmental testing with greater mission focus to evaluate performance and reliability (p. 13)."

The SSC Acquisition Strategy was approved and the Detail Design and Construction (DD&C) contract awarded in FY12 prior to this initiative. The SSC Milestone B ADM also put into place specific exit criteria for LCAC 102-103 and additional criteria for LCAC 104-108 that will ensure all the appropriate developmental testing requirements are achieved.

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Acronyms and Abbreviations

ASN(RD&A)	Assistant Secretary of the Navy (Research, Development, and Acquisition)
DASD(DT&E)	Deputy Assistant Secretary of Defense for Developmental Test and Evaluation
GAO	Government Accountability Office
LCAC	Landing Craft Air Cushion
SSC	Ship-to-Shore Connector
USD(AT&L)	Under Secretary of Defense for Acquisition, Technology, and Logistics

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