

Department of Homeland Security **Office of Inspector General**

U.S. Coast Guard's Acquisition of the
Sentinel Class – Fast Response Cutter






Homeland Security

August 31, 2012

MEMORANDUM FOR: The Honorable Admiral Robert J. Papp, Jr.
Commandant
United States Coast Guard

FROM: 
Carlton I. Mann
Acting Deputy Inspector General

SUBJECT: Re-issuance of Audit Report OIG-12-68, *U.S. Coast Guard's Acquisition of the Sentinel Class – Fast Response Cutter*

I am writing to inform you that the Department of Homeland Security (DHS) Office of Inspector General (OIG) has recalled the subject report and is now re-issuing it to modify the statement of compliance with generally accepted government auditing standards (GAGAS). We took these actions because it recently came to our attention that the family member of a senior OIG official was employed by an entity associated with this audit.

To ensure that this impairment did not affect our findings and conclusions, we thoroughly reviewed our work on this audit, as well as the results. Through this review, we verified that the impairment did not affect our results; our evidence is sound and fully supports our findings and conclusions. Therefore, we are re-issuing this report and re-posting it on our website. The report is unchanged except for the statement of compliance with GAGAS found on page 19 of Appendix A – Purpose, Scope, and Methodology.

We remain committed to assisting the Department in improving its effectiveness and efficiency to better carry out its mission, and we appreciate your support of our work. Please do not hesitate to call me or your staff may contact Anne L. Richards, Assistant Inspector General for Audits, at (202) 254-4100 if you have any questions or concerns.

Attachment



**Homeland
Security**

August 31, 2012

Preface

The Department of Homeland Security (DHS) Office of Inspector General (OIG) was established by the *Homeland Security Act of 2002* (Public Law 107-296) by amendment to the *Inspector General Act of 1978*. This is one of a series of audit, inspection, and special reports prepared as part of our oversight responsibilities to promote economy, efficiency, and effectiveness within the Department.

This report addresses the effectiveness of the United States Coast Guard's Sentinel Class – Fast Response Cutter acquisition. It is based on interviews with employees and officials of relevant agencies and institutions, direct observations, and a review of applicable documents.

The recommendations herein have been developed to the best knowledge available to our office, and have been discussed in draft with those responsible for implementation. We trust this report will result in more effective, efficient, and economical operations. We express our appreciation to all of those who contributed to the preparation of this report.

A handwritten signature in cursive script that reads "Anne L. Richards".

Anne L. Richards

Assistant Inspector General for Audits

Table of Contents/Abbreviations

Executive Summary	1
Background	2
Results of Audit	4
The Coast Guard’s Oversight of the Fast Response Cutter Contract	4
The Coast Guard’s Schedule-Driven Procurement Strategy	6
Recommendations	13
Management Comments and OIG Analysis	13

Appendices

Appendix A: Purpose, Scope, and Methodology	18
Appendix B: Management Comments to the Draft Report	20
Appendix C: Comparison of Island-Class Patrol Boat and Fast Response Cutter ..	23
Appendix D: Major Contributors to This Report	24
Appendix E: Report Distribution	25

Abbreviations

DHS	Department of Homeland Security
DOT&E	Director, Operational Test and Evaluation
FRC	Fast Response Cutter
OIG	Office of Inspector General

OIG

*Department of Homeland Security
Office of Inspector General*

Executive Summary

In September 2008, the Coast Guard awarded Bollinger Shipyards, LLC, an \$88.2 million fixed-price contract for the detailed design and construction of the lead Sentinel Class Fast Response Cutter. The contract contains six options to build a maximum of 34 cutters, worth up to an estimated \$1.5 billion. As of September 2011, the Coast Guard had awarded three contract options for 12 cutters, with a total contract price of \$597.3 million. We performed this audit to determine whether the Coast Guard's oversight of the Fast Response Cutter acquisition ensures that the provisions of the contract reflect the Coast Guard's stated operational requirements and the contractor is meeting the contract's provisions.

The Coast Guard's oversight of the Fast Response Cutter acquisition has helped ensure that the provisions of the contract reflect the Coast Guard's operational requirements and that the contractor is meeting the contract's provisions. However, the Coast Guard has executed an aggressive, schedule-driven strategy that allowed construction of the Fast Response Cutters to start before operational, design, and technical risks were resolved. Consequently, six cutters under construction required rework that resulted in at least 270 days of schedule delays for each cutter and a total cost increase of \$6.9 million for the acquisition. This aggressive acquisition strategy also allowed the Coast Guard to procure 12 Fast Response Cutters before testing the lead cutter in actual operations. It is uncertain whether the Fast Response Cutter will perform as intended until it completes operational test and evaluation in actual maritime environments.

If operational test and evaluation on the lead Fast Response Cutter reveals deficiencies, the Fast Response Cutters may incur additional costly rework and delays, or the Coast Guard may have to accept Fast Response Cutters that do not fully meet its mission requirements. This may hinder the Coast Guard's ability to fill the critical shortages in its patrol boat fleet. The Coast Guard concurred with two recommendations and partially concurred with the remaining three recommendations to improve this and future acquisitions.

Background

The U.S. Coast Guard is acquiring the Sentinel Class Fast Response Cutter (FRC) to fill its critical need for additional patrol boats and to replace the aging Island-class 110-foot patrol boats. The FRC is intended to perform multiple missions, including search and rescue, migrant interdiction, drug interdiction, and law enforcement. It is the first major acquisition to be brought under the direct management of the Coast Guard after being formerly contracted through the Deepwater program. Deepwater was a major integrated systems acquisition program, administered by a lead systems integrator, designed to replace, modernize, and sustain the Coast Guard's aging fleet of ships and aircraft. The Coast Guard elected to bring the FRC acquisition in-house to achieve faster delivery, reduced cost, and increased contract competition.



Figure 1: Lead Fast Response Cutter – *Bernard C. Webber* (U.S. Coast Guard).

The FRC will perform the same missions as the Island-class 110-foot patrol boats, but has key improvements in seakeeping, command and control, and weapon systems (see appendix C for a comparison between the Island-class 110-foot patrol boat and the FRC). The FRC also added a small boat stern launch and recovery system to achieve safer and more efficient operations. The FRC's small boat is critical to the successful execution of the FRC's

primary missions. It can hold up to five crewmembers and reach speeds of 40 knots.

Additionally, the Coast Guard elected to use a proven design (parent craft) to mitigate FRC performance and schedule risk. The Coast Guard based the FRC's design on the Damen 4708, with the following modifications:

- Increase of flank speed from 23.8 to 28+ knots;
- Addition of a stern ramp for small boat launch and recovery;
- Modification of propeller design to save weight, reduce complexity, and improve speed;
- Inclusion of watertight bulkheads;
- Modification of electrical systems; and
- Reconfiguration of interior arrangements to enhance habitability, incorporate stern launch, and support increased command, control, communications, computers, intelligence, surveillance, and reconnaissance systems.

Furthermore, the FRC is being designed and constructed to meet the American Bureau of Shipping High Speed Naval Craft rules and guidelines, which provide additional assurance that the FRC is structurally and mechanically sound.

In September 2008, the Coast Guard competitively awarded Bollinger Shipyards, LLC, an \$88.2 million fixed-price contract for the detailed design and construction of the first FRC. The contract contains six options to build a maximum of 34 cutters, worth up to an estimated \$1.5 billion. As of September 2011, the Coast Guard had exercised three contract options for 12 FRCs at a total contract price of \$597.3 million. Per the FRC's Acquisition Program Baseline Document, which represents the minimum cost, schedule, and performance measures approved by DHS for the acquisition, the lead FRC was to be delivered no later than December 31, 2011. However, the lead FRC was delivered on February 10, 2012, subsequent to the issuance of our draft report. The Coast Guard has notified DHS of the schedule breach and is currently revising its FRC Acquisition Program Baseline. The Coast Guard plans to submit the revised Acquisition Program Baseline to DHS for approval by June 2012.

The Coast Guard has attributed the schedule delay to rework that occurred for six FRCs under construction and a protest that was filed which required a work stop order for 97 days when the FRC

contract was awarded, neither of which was reflected in the Acquisition Program Baseline. Although the Coast Guard modified the contract schedule delivery date to January 30, 2012 to account for these delays, the contractor still delivered the lead FRC 11 days late under the modified contract delivery schedule. The Coast Guard has withheld approximately \$200,000 from payment against the fixed-price contract for the late delivery. According to the Coast Guard, the contract price will be reduced or other consideration of equal value will be obtained from the contractor for the late delivery, pending a final determination by the Contracting Officer.

The FRCs are being built at Bollinger's Lockport, LA, shipyard, where the Coast Guard has established an onsite project resident office to oversee the project. The Coast Guard plans to procure a total of 58 FRCs to fill its critical patrol boat gap and requested \$27.2 million in fiscal year 2012 appropriations to purchase the design and data rights to recompile the contract for the remaining FRCs.

We conducted this audit to determine whether the Coast Guard's oversight of the FRC acquisition ensures that the provisions in the contract reflect the Coast Guard's stated operational requirements and that the contractor is meeting the contract's provisions.

Results of Audit

The Coast Guard's oversight of the FRC acquisition has helped ensure that the provisions of the contract reflect the Coast Guard's stated operational requirements and the contractor is meeting the contract's provisions. However, the Coast Guard's schedule-driven strategy allowed construction of the FRCs to start before operational, design, and technical risks were resolved. Consequently, six FRCs under construction needed modification, which increased the total cost of the acquisition by \$6.9 million and caused schedule delays of at least 270 days for each cutter. This aggressive acquisition strategy also allowed the Coast Guard to procure 12 FRCs before testing it in actual operations. It is uncertain whether the FRC will perform as intended until it completes operational test and evaluation in an actual maritime environment.

The Coast Guard's Oversight of the Fast Response Cutter Contract

The Coast Guard uses a collaborative approach to oversight. The Coast Guard's project sponsor, project resident office, and technical authorities

provide direct oversight of the FRC acquisition. This oversight has helped ensure that the FRC contract reflects the Coast Guard's stated operational requirements and that the FRC will be delivered with the capabilities specified in the contract. However, the Coast Guard cannot determine how suitable and effective the FRC's delivered capabilities are at conducting required Coast Guard missions until the FRC is tested during operational test and evaluation in an actual maritime environment.

Contract Reflects Operational Requirements

Operational requirements specify the desired capabilities of an asset and are usually described in an Operational Requirements Document. The Operational Requirements Document is intended to serve as a source document to a contract's technical specification and supports a host of design activities. Initially, the Coast Guard did not develop a formal Operational Requirements Document or define the FRC's critical operational issues prior to contract award. Instead, it used a set of Top Level Requirements to develop the contract.

This approach introduced additional risk that some operational requirements might not be included in the design. However, the Coast Guard mitigated this risk by developing the FRC Operational Requirements Document in December 2009. The Coast Guard also conducted an Early Operational Assessment in 2009 to validate that the FRC's preliminary design met the Coast Guard's needs. Coast Guard technical authority review of the FRC design disclosed that enhancements were needed to certain areas of the FRC's structure to further mitigate risks posed by the unique missions of the Coast Guard. The Coast Guard modified its contract in February 2011 to include the provisions needed to help ensure that the FRC would meet its structural requirements for mission operations.

We reviewed and analyzed the Coast Guard's Operational Requirements Document and the contract's technical specifications. The FRC's operational requirements were reflected in the contract's technical specifications. Therefore, the provisions of the contract reflect the Coast Guard's stated operational requirements.

Contractor Is Meeting Contract Requirements

The Coast Guard technical authorities and onsite project resident office provide the oversight needed to ensure that the contractor is

meeting the contract's provisions. The Coast Guard's technical authorities review and make recommendations on the FRC's design. Project resident office personnel perform contract administration and provide technical, production, and logistics oversight of the contractor. The technical authorities have provided timely review and comments to the contracting officer on submitted drawings, calculations, and analysis. Furthermore, Coast Guard personnel plan to participate in shipboard tests and sea trials to verify the performance of major components and systems.

The contract requires that the design and construction of the FRC's basic hull mirror that of its parent craft used in patrol boat operations. It also requires land-based testing of some major components and systems, such as the FRC's main engines. Also, the contractor has provided a full-scale mockup of the FRC bridge for testing and training purposes.

The Coast Guard's oversight of the contractor, as well as the use of a parent craft design, land-based testing, and sea trials, helps ensure that the FRC will be delivered with the capabilities specified in the contract. These requirements establish the basic seaworthiness and mechanical soundness of the vessel. However, the Coast Guard will not be able to establish how suitable or effective the FRC is at conducting the required missions until it is tested in actual operations. According to the Coast Guard, it plans to complete testing of the FRC in actual operations by March 2013.

The Coast Guard's Schedule-Driven Procurement Strategy

The Coast Guard's use of a schedule-driven procurement strategy has allowed it to award contract options for FRCs before operational, design, and technical risks were resolved. This strategy also allowed the Coast Guard to procure 12 FRCs before operational test and evaluation of the lead cutter was completed and before determining the suitability and effectiveness of the FRC in meeting the Coast Guard mission needs.

The Coast Guard's *Major Systems Acquisition Manual* specifies that the Coast Guard must use a knowledge-based acquisition process. Best practices in federal contracting recognize that acquisition strategies should be based on knowledge gained at specific milestones. Decision-makers should use information gained from milestone meetings to make informed acquisition decisions. The Government Accountability Office reports that implementing a knowledge-based approach to acquisitions reduces the risk

of cost, schedule, and quality shortfalls. The Coast Guard's *Major System Acquisition Manual* also generally requires that production be limited to what is required to minimally sustain production until operational test and evaluation is completed.

The Coast Guard's schedule-driven acquisition strategy was reflected in a November 2006 decision memo, approved by the U.S. Coast Guard Agency Acquisition Executive, which directed the Coast Guard to pursue an "expeditious acquisition of patrol boat capability to ameliorate the current ...operating hour shortfall." This memo further stated that the "delivery date will be a prime determinant in decisions made throughout this procurement program."

The Coast Guard has acknowledged that its aggressive procurement strategy places the FRC at an increased risk of costly rework. However, the Coast Guard stated that the need to fill mission-critical shortages in its patrol boat fleet justified its schedule-driven procurement strategy. Further, the Coast Guard stated that it has mitigated the risks presented by its strategy through use of a parent craft design, the American Bureau of Shipping classification requirements, an Early Operational Assessment, technical authority involvement in design reviews, and land-based testing requirements for major FRC components.

However, the Coast Guard's aggressive procurement strategy allowed the contractor to start FRC production before the Coast Guard resolved important issues identified in the Early Operational Assessment, design reviews, and testing. Further, the Coast Guard's contract structure limited its ability to minimize low-rate initial production levels by requiring it to contract annually for a specified number of FRCs.

Risks Identified During Early Operational Assessment

In May and June 2009, the FRC Early Operational Assessment identified risks to the FRC's mission operations. Subject matter experts conducted this tabletop exercise to validate that the FRC could meet the Coast Guard's operational needs. However, the Coast Guard did not implement two recommendations from the Early Operational Assessment to mitigate the risk that the FRC would not meet Coast Guard needs before it contracted for 12 FRCs:

1. The Coast Guard did not operationally assess whether the small boat stern launch and recovery system will be able to meet the Coast Guard's needs in actual mission operations. The Coast

Guard technical authority noted that the FRC stern launch and recovery system has limited clearance, which may increase the difficulty of recovering the small boat in certain operating conditions (see figure 2 for illustration of stern launch system).

2. The Coast Guard did not verify that the FRC is capable of stowing all gear (e.g., damage control equipment, onboard repair parts, life preservers) required for its safe operation and maintenance. The Coast Guard responded to this risk by saying, “Due to the nature of lead ship production, although we have stowage designs, validation of the stowage arrangement is limited until production is completed and onload of outfit can occur.”

If operational test and evaluation shows that the small boat interface or the stowage is not effective, the Coast Guard may incur additional costly rework and delays.



Figure 2: FRC stern launch system (U.S. Coast Guard).

Risks Identified During Design Review and Testing

Additional risk was demonstrated during the FRC Critical Design Review, which is intended to ensure that design is sufficiently mature prior to construction. Once construction has started, any design or technical deficiencies could be significantly more costly and time-consuming to correct.

The Coast Guard's Critical Design Review was approved on December 2, 2009, despite the existence of known design risk. For example, structural details and drawings ranged from 66% to 73% complete, and the FRC's speed and power analysis had been rejected and returned by the technical authority. The Coast Guard approval memo for Critical Design Review documents a design maturity level of 80%. However, our analysis of design data provided by the Coast Guard's Office of Naval Engineering disclosed a median design maturity of 71% as of the date of Coast Guard's Critical Design Review. Design maturity is the term used to describe the percentage of completion of specific engineering and planning drawings or documents. We based our calculation of 71% design maturity on the design requirements specified in the contract for Coast Guard approval at Critical Design Review. Both the Government Accountability Office and the U.S. Navy recognize that a mature design prior to the start of construction reduces design risk, enables a more stable construction schedule, and lowers the risk of increased cost. The Government Accountability Office has identified, as an acquisition best practice, that at least 90% of engineering drawings should be completed prior to construction.¹ The U.S. Navy requires 85% design maturity as a prerequisite for the start of construction.

During Critical Design Review, the technical authorities raised concerns about the structure of the FRC. Although the Coast Guard revised the contract to mitigate these concerns and reflect its requirements, it did not do so until 13 months after Critical Design Review and the award of two contract options. The Coast Guard attributes the 13-month delay primarily to the time required to review the extensive computerized modeling of the FRC structure. The contract required that the FRC structure be designed and constructed according to the American Bureau of Shipping rules. However, the Coast Guard ultimately determined that the American Bureau of Shipping rules and guidelines for structural

¹ GAO-02-701: *Capturing Design and Manufacturing Knowledge Early Improves Acquisition Outcome*, July 2002.

design would not sufficiently mitigate risks to the FRC's structure and required structural enhancements to the design of the FRC. These structural enhancements were not identified until construction of the lead FRC was 80% complete and construction of the next three FRCs was more than 50% complete. As a result, the contractor had to remove portions of completed construction to make the structural design changes. Because the Coast Guard requested these changes, the structural modifications will cost an additional \$6.9 million and delay the delivery of each FRC by at least 270 days. According to the Coast Guard, this cost increase is well within the funds set aside for antecedent liabilities for necessary technical changes normally encountered during the design and construction of a lead ship.

The FRC contract also requires the contractor to certify the main diesel engines to the American Bureau of Shipping Naval Vessel Rules. In December 2009, before the Coast Guard awarded the first option contract, it noted technical issues with the engine certification. Additional technical issues with the engine were discovered during testing in July 2010. These issues remained a risk until September 2011. Between July 2010 and September 2011, the Coast Guard exercised two contract options that brought the number needing refits to 12 engines.

Contract Structure and Use of Low-Rate Initial Production

The Coast Guard's use of a schedule-driven procurement strategy allowed it to procure 12 FRCs under low-rate initial production and before operational test and evaluation of the lead FRC is completed. The FRC's contract structure limited the Coast Guard's ability to minimize low-rate initial production levels by requiring it to contract for a specified number of FRCs annually. This also limited the Coast Guard's ability to mitigate the risk of additional costly rework and delays by keeping the number of FRCs produced to a minimum during low-rate initial production.

Low-rate initial production is an acquisition phase, and its approval authorizes the contractor to start production. The purpose of low-rate initial production is to produce enough quantities of an article for operational test and evaluation, to establish an initial production base, and to confirm soundness before full-rate production. Full-rate production can only officially begin once operational test and evaluation is complete. Low-rate initial production limits the risk of acquiring new or unproven technology

by minimizing the number of FRCs produced until its design is finalized and the FRC is tested in operational test and evaluation.

Operational test and evaluation is conducted to determine how well the FRC performs its mission assignments and to examine the extent to which the FRC is safe, reliable, maintainable, and logistically supportable. The results of operational test and evaluation also indicate how well the performance measures for the acquisition have been satisfied and support the decision to move the acquisition into full production.

The Coast Guard's contract required delivery of the lead FRC within 2 years of contract award. Additionally, the contract stipulates that the Coast Guard exercise an option to purchase a set number of additional FRCs each fiscal year, or the remainder of the contract options will be terminated. The contract allows the Coast Guard to purchase three FRCs under option one for low-rate initial production, and four or six for every option thereafter under full-rate production. This contract structure has limited the Coast Guard's ability to restrict its FRC low-rate initial production to fewer than three to four FRCs annually until operational test and evaluation is completed and the Coast Guard is certain that the FRC will meet its mission needs.

The Coast Guard has already contracted for 12 FRCs, or 35% of the maximum of 34 FRCs that can be acquired under this contract, while the acquisition is still in low-rate initial production. The Coast Guard has a policy that major acquisitions must set individual limits for low-rate initial production. Initially, low-rate initial production for the FRC was set at three FRCs. However, by October 2010, the Coast Guard had raised the number of FRCs that could be acquired under low-rate initial production to 14.

Best practices have shown that completing operational test and evaluation before producing significant quantities substantially lowers the risk of costly fixes and retrofits. Thus, making high-percentage buys during low-rate initial production increases the risk that the FRC will incur costly fixes and retrofits. The U.S. Navy has a general practice that only 10% of an acquisition should be acquired during low-rate initial production. However, the Coast Guard does not have a policy on how many units should be acquired under low-rate initial production to mitigate risk.

If the Coast Guard exercises another contract option prior to the completion of operational test and evaluation, it will have contracted for at least 16 FRCs under low-rate initial production, or 47% of the 34 possible FRCs to be acquired under this contract. Additionally, this represents 28% of the total 58 FRCs that the Coast Guard plans to acquire. As a result, the Coast Guard risks that any deficiencies discovered during operational test and evaluation will need to be fixed on a significant number of FRCs that are in production or have been delivered.

The Coast Guard is currently planning to assess the risk related to its low-rate initial production decisions by conducting an operational assessment prior to delivery of the lead FRC. However, construction of the first eight FRCs has already significantly advanced. Therefore, this operational assessment is limited in its ability to mitigate the risk of cost increases or delays.

Use of Operational Assessments To Mitigate Risk

Operational assessments are a recognized method for identifying areas of risk and the ability to meet performance goals in operations. Operational assessments may focus on a limited set of operational requirements and are not required to be conducted in realistic maritime environments. Rather, they may be conducted at any time throughout the acquisition life cycle using technology demonstrators, prototypes, mockups, or simulations. They do not substitute for the operational test and evaluation necessary to support full-rate production decisions. The U.S. Navy requires that an operational assessment be performed to support a low-rate initial production decision on major acquisitions.

Following the initiation of our audit, the Coast Guard requested that its independent test agent conduct an operational assessment of the lead FRC. According to the Coast Guard, this operational assessment is planned to take place over 2 days in early December 2011, prior to delivery of the lead FRC. Although an operational assessment is not a substitute for operational test and evaluation, it can reveal problems at a time when they can still be corrected on future FRCs. Although this operational assessment may mitigate the risk of cost increases or delays to future FRCs, its effectiveness is still limited, as construction on the first eight FRCs is significantly advanced.

Recommendations

We recommend that the Assistant Commandant for Acquisitions, U.S. Coast Guard:

Recommendation #1: Ensure that future acquisitions employ a knowledge-based acquisition strategy to the maximum extent practicable by revising the U.S. Coast Guard's *Major Systems Acquisition Manual* to allow for a schedule-driven acquisition strategy to be employed only when it is properly authorized and supported by the results of a risk assessment and cost-benefit analysis.

Recommendation #2: Improve low-rate initial production decisions for the U.S. Coast Guard Surface Acquisition programs by issuing a policy memorandum that requires that it achieve a specific level of design maturity at Critical Design Review.

Recommendation #3: Issue a policy memorandum that requires authorization to proceed with low-rate initial production be supported by the reported results of operational assessments.

Recommendation #4: Revise the Coast Guard's acquisition policy to require a documented risk assessment when low-rate initial production quantity exceeds 10%, or other Coast Guard established minimum, of the total quantity approved for the acquisition.

Recommendation #5: Mitigate risk by executing plans for an operational assessment prior to delivery of the lead FRC and take immediate action to implement recommendations from the operational assessment. Any recommendations not implemented should be supported by the results of a risk assessment and cost-benefit analysis.

Management Comments and OIG Analysis

The Coast Guard provided comments on the draft of this report. A copy of the response in its entirety is included in appendix B. The Coast Guard also provided technical comments and suggested revisions to our report in a separate document, which the Coast Guard stated was not intended to be included with its official comments on the draft of this report. We reviewed the Coast

Guard's technical comments and made changes throughout our report where appropriate.

Management Comments to Recommendation #1

Partially Concur. The Coast Guard stated that although the FRC acquisition has an aggressive schedule, it properly followed the Coast Guard and DHS "knowledge based" acquisition management policies and processes. The Coast Guard agrees that schedule-driven acquisition strategies should be employed only when properly authorized and supported by the results of a risk assessment and cost-benefit analysis.

OIG Analysis

As discussed in our report, the FRC acquisition strategy employed an aggressive acquisition schedule and the contract required the annual award of options for either three or four cutters to avoid contract termination. This strategy served to diminish the usefulness of knowledge gained at specific milestones for acquisition investment decisions, as the Coast Guard had to either award the annual contract options for the set number of cutters or terminate the contract. The Coast Guard stated it will work with DHS Program Accountability and Risk Management to consider promulgating future guidance, as appropriate, to meet the intent of the recommendation. The Coast Guard needs to ensure it has a process in place to prevent future acquisitions that may employ a similarly aggressive acquisition strategy from being approved until supported by the results of a risk assessment and cost-benefit analysis.

We consider this recommendation to be unresolved and open. This recommendation will remain unresolved until the Coast Guard provides us with an action plan to promulgate such guidance that includes responsible officials and the targeted completion date.

Management Comments to Recommendation # 2

The Coast Guard separated its comments to recommendation 2, as presented in the draft report, into three distinct responses to more effectively address the OIG intent. Therefore, we have separated our original recommendation number 2 into recommendations 2 (2.1), 3 (2.2), and 4 (2.3), and recommendation 3 into recommendation 5.

Partially Concur. The Coast Guard recognized that design maturity is an important element of reducing acquisition risk. The Coast Guard also acknowledged that, as a general rule of thumb, the design should be approximately 85% complete at Critical Design Review.

OIG Analysis

As discussed in our report, both the Government Accountability Office and the Department of the Navy recognize that completion of a mature design prior to the start of construction has proven to reduce design risks, reduce the risk of cost increases, and enable a more stable construction schedule. Both the Government Accountability Office and the Department of the Navy recommend that shipbuilding programs meet a specified “rule of thumb” level of design maturity prior to construction. The intent of the recommendation is that the Coast Guard develop similar “rule of thumb” policies for its ship acquisition programs. The Coast Guard has stated that it agrees with the intent of this recommendation and will work with DHS Program Accountability and Risk Management to promulgate future guidance, as appropriate, to meet the intent of this recommendation.

We consider this recommendation to be unresolved and open. This recommendation will remain unresolved until the Coast Guard provides us with an action plan to promulgate such guidance that includes responsible officials and the targeted completion date. This recommendation will remain open until we receive and review Coast Guard guidance issued to address the recommendation.

Management Comments to Recommendation # 3

Partially Concur. The Coast Guard stated it agrees with the intent but not the mandatory requirement to complete an Operational Assessment prior to Critical Design Review for all acquisitions and relies on the DHS Director of Operational Test and Evaluation (DOT&E) to establish test and evaluation policy. The Coast Guard further noted that an Early Operational Assessment is appropriate for Critical Design Review assessments, and stated that an Operational Assessment needs to have an asset on hand to complete the assessment. The Coast Guard also stated that an Early Operational Assessment for the FRC was conducted in June

2009 and that a follow on Operational Assessment was completed February 3, 2011, on the lead ship prior to acceptance.

OIG Analysis

The Coast Guard's Major Systems Acquisition Manual does not provide a specific definition for either Early Operational Assessment or Operational Assessment. Consistent with Department of the Navy definitions, we consider Operational Assessments to include Early Operational Assessments and do not differentiate between the two for the purposes of this recommendation. Further, although the Coast Guard's Major Systems Acquisition Manual indicates that the conduct of either an Early Operational Assessment or an Operational Assessment is an elective, rather than mandatory requirement, the Major Systems Acquisition Manual also indicates that both are intended to assess how well the design is expected to provide the desired operational capability and are used to support low-rate initial production decisions, as appropriate. Given the complex nature and considerable expense associated with shipbuilding, the Coast Guard should require its shipbuilding acquisition programs to assess how well the design is expected to meet its needed operational capabilities prior to committing to production to further reduce the risk of schedule delays and cost increases resulting from design changes. The Coast Guard has stated it will work with the DHS DOT&E to promulgate future guidance, as appropriate, to meet the intent of this recommendation.

We consider this recommendation to be unresolved and open. This recommendation will remain unresolved until the Coast Guard provides us with an action plan to promulgate such guidance that includes responsible officials and the targeted completion date and we review Coast Guard guidance issued to address the recommendation.

Management Comments to Recommendation # 4

Concur. The Coast Guard agrees that low-rate initial production decisions that exceed 10% of the full production quantities should be supported by a documented risk assessment. It noted that DHS' low-rate initial production policy has been revised recently to limit the production quantities and the Coast Guard Major Systems Acquisition Manual is being revised to reflect the DHS policy.

OIG Analysis

We consider the ongoing action to be responsive to the recommendation and the recommendation resolved. However, this recommendation will remain open until we receive and review a copy of the revised Major Systems Acquisition Manual with the updated low-rate initial production policy.

Management Comments to Recommendation # 5

Concur. The Coast Guard concurred with our recommendation to execute plans for an Operational Assessment prior to the delivery of the lead FRC and to take immediate actions to implement any recommendations from the Operational Assessment. It noted that an Operational Assessment was recently completed prior to the lead FRC acceptance and a report will be delivered in 2012.

OIG Analysis

We consider the actions taken by the Coast Guard to be responsive to the recommendation and the recommendation resolved. However, the recommendation will remain open until we receive and review a copy of the Operational Assessment report and Coast Guard verification that recommendations in the Operational Assessment report have been implemented.

Appendix A

Purpose, Scope, and Methodology

We conducted this audit to determine whether the Coast Guard's oversight of the FRC acquisition ensures that (1) the provisions in the contract reflect the Coast Guard's stated operational requirements; and (2) the contractor is meeting the provisions in the contract.

We reviewed departmental, federal, and Coast Guard acquisition policies and processes, acquisition decisions, and other memorandums. These included the Department of Homeland Security (DHS) *Acquisition Directive 102-01*, *DHS Acquisition Instruction/Guidebook 102-01-001*, *DHS Directive 026-06*, *Test and Evaluation*, the Coast Guard *Major Systems Acquisition Manual*, the Coast Guard *Requirements Generation and Management Process (Pub 7-7) Manual*, and the Department of the Navy, Commander, Operational Test and Evaluation Force *Test Director's Manual*.

We also reviewed the FRC contract, the FRC Operational Requirements Document, the approved Top Level Requirements for the FRC, and the approved FRC Acquisition Program Baseline. To determine design maturity, we reviewed the percentage completion of all contract data requirement list drawings, analysis, and calculations required by the contract at Critical Design Review. We also reviewed documentation produced from design reviews and production meetings, as well as Coast Guard technical authority design review comments. We reviewed the updated integrated master schedule, budget requests, and cost estimates for the project, and we analyzed progress payments to the contractor.

We relied on computer-processed data provided by the Coast Guard to calculate median design maturity and technical authority comment response days. We performed analytical procedures to identify anomalies in reported dates and determined that the data contained date anomalies of less than 1%. We also judgmentally sampled 20% of the items and confirmed the reported degree of maturity for each item against corroborating documentation to verify the accuracy of reported design maturity.

We visited the project resident office in Lockport, LA, and observed Coast Guard oversight of FRC construction, a mockup of the pilothouse, rework conducted to enhance the FRC structure, and ongoing construction of the FRCs.

Appendix A

Purpose, Scope, and Methodology

We interviewed senior Coast Guard Acquisition Directorate officials, the Coast Guard technical and support authorities, program and project managers, and contracting and acquisition officials responsible for the management, oversight, and execution of the acquisition of the FRC. We also interviewed representatives of the American Bureau of Shipping, the U.S. Navy's Naval Sea Systems Command, and Commander, Operational Test and Evaluation Force.

We conducted this performance audit between June 2011 and October 2011 pursuant to the *Inspector General Act of 1978*, as amended, and according to generally accepted government auditing standards (GAGAS), except that we identified an impairment to our independence in appearance. Following completion of our audit, it came to our attention that a family member of a senior OIG official was employed by an entity associated with this audit. We took steps to re-evaluate the evidence supporting our findings and conclusions. In our opinion, the impairment to our independence in appearance did not affect the findings and conclusions developed during this audit.

GAGAS requires that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based upon our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based upon our audit objectives, and that the impairment to our independence in appearance did not affect this evidence or any findings and conclusions.

We would like to thank the Coast Guard, the American Bureau of Shipping, and the U.S. Navy for the cooperation and courtesies extended to our staff during this audit.

Appendix B

Management Comments to the Draft Report

U.S. Department of
Homeland Security
United States
Coast Guard



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MEMORANDUM

FEB 13 2012

From: 
RDML S. P. Metruck
COMDT (CG-8)

Reply to: Audit Manager,
Attn of: Mark Kulwicki
(202) 372-3533

To: Anne L. Richards
Assistant Inspector General for Audits

Subj: DHS OIG DRAFT REPORT ON UNITED STATES COAST GUARD'S
ACQUISITION OF THE SENTINEL CLASS – FAST RESPONSE CUTTER

Ref: (a) DHS OIG Draft Report dated December 29, 2011

1. This memorandum transmits the Coast Guard's response to the findings and recommendations identified in reference (a).
2. If you have any questions, my point of contact is Mr. Mark Kulwicki who can be reached at (202) 372-3533.

#

Enclosure: (1) USCG Response
(2) USCG Technical Comments

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Appendix B

Management Comments to the Draft Report

UNITED STATES COAST GUARD STATEMENT ON DEPARTMENT OF HOMELAND SECURITY OFFICE OF INSPECTOR GENERAL

U.S. COAST GUARD'S ACQUISITION OF THE SENTINEL CLASS – FAST RESPONSE CUTTER (11-051-AUD-USCG)

INTRODUCTION

Thank you for the opportunity to review and comment on Department of Homeland Security (DHS) Office of Inspector General's (OIG's) Draft Report 11-051-AUD-USCG entitled, "U.S. Coast Guard's Acquisition of the Sentinel Class – Fast Response Cutter."

RECOMMENDATIONS AND USCG RESPONSES

Recommendation #1: Ensure that future acquisitions employ a knowledge-based acquisition strategy to the maximum extent practicable by revising the U.S. Coast Guard's Major Systems Acquisition Manual (MSAM) to allow for a schedule-driven acquisition strategy to be employed only when it is properly authorized and supported by the results of a risk assessment and cost-benefit analysis (CBA).

USCG Response: Partially Concur. The U.S. Coast Guard (USCG) agrees that all future acquisitions should employ a knowledge-based acquisition strategy. Both the USCG and DHS employ a "knowledge based" acquisition process with multiple governance reviews by the USCG Acquisition Review Board and DHS Investment Review Boards. The USCG also agrees with the recommendation that the approval of schedule-driven acquisition strategies should be supported by a risk assessment and CBA. Although the FRC acquisition has an aggressive schedule, it properly followed the USCG and DHS "knowledge based" acquisition management policies and processes, which included demonstrating satisfactory completion of exit criteria for DHS approval to proceed to subsequent acquisition phases.

The USCG will work with DHS Program Accountability and Risk Management (PARM) to consider promulgating future guidance, as appropriate, to meet the intent of this recommendation.

Recommendation #2: Improve low-rate initial production decisions for the U.S. Coast Guard's Surface Acquisition programs by issuing a policy memorandum that requires it to achieve a specific level of design maturity at Critical Design Review and that the authorization to proceed with low-rate initial production is supported by the reported results of operational assessments. Additionally, when the number of low-rate initial production originally set at the start of the acquisition exceeds 10% or another Coast Guard-established minimum, it should be supported by a documented risk assessment.

USCG Response: The USCG response to Recommendation #2 is broken into three separate parts as follows:

Recommendation 2.1: Issue a policy memorandum that requires a specific level of design maturity at Critical Design Review:

Partially Concur. The Critical Design Review (CDR) is deemed successful when the contractor demonstrates that the design is stable and producible and can deliver the requirements defined in

ENCLOSURE (1)

Appendix B

Management Comments to the Draft Report

the contract. Past practices (as defined in the 2001 version of the Department of Defense Systems Management College (DSMC) Systems Engineering Fundamentals Guide) provides the following guidance *“Rough Rule of Thumb: At CDR the design should be approximately 85% complete. This rule is anecdotal and only guidance relating to an “average” defense hardware program.”* The USCG agrees with the intent of this rule of thumb and will work with DHS PARM to promulgate future guidance, as appropriate, to meet the intent of this recommendation.

Recommendation 2.2: Issuing a policy memorandum that requires authorization to proceed with low-rate initial production be supported by the reported results of operational assessments:

Partially Concur. The USCG agrees with the intent but not the mandatory requirement to complete an Operational Assessment (OA) prior to CDR for all acquisitions and relies on DHS DOT&E to establish T&E policy. The USCG will work with DHS DOT&E to promulgate future guidance, as appropriate, to meet the intent of this recommendation.

An Early Operational Assessment (EOA) is appropriate for CDR assessments, whereas an OA needs to have an asset on hand to complete the assessment.

FRC completed CDR on 2 Dec 09, conducted an EOA in August 2009 and completed a follow on OA (February 3rd, 2012) on the lead ship prior to acceptance. Independent Operational Test and Evaluation (IOT&E) is planned for September 2012, with the results available officially in 2QFY13, completing a comprehensive T&E strategy as approved by DHS DOT&E.

Recommendation 2.3: When the number of low-rate initial production (LRIP) originally set at the start of the acquisition exceeds 10% or another Coast Guard-established minimum, it should be supported by a documented risk assessment.

Concur. In accordance with D-102-01 (20 Jan 10) and Guidebook D-102-01-001 (1 Oct 11), the Acquisition Decision Authority (ADA) approves the LRIP quantity at ADE-2A/B and LRIP execution at ADE-2C. The recently revised Guidebook includes the following statement: “LRIP quantities shall be minimized and identified in the program documentation for ADE-2B. Rationale for quantities greater than 10% of the full production quantities identified in the Acquisition Plan must be documented.”

The USCG MSAM is being revised to reflect the recent 10% LRIP DHS policy and is expected to be completed by 3QFY12.

Recommendation #3: Mitigate risk by executing plans for an operational assessment prior to delivery of the lead FRC and take immediate action to implement recommendations from the operational assessment. Any recommendations not implemented should be supported by the results of a risk assessment and cost-benefit analysis.

USCG Response: Concur. The USCG completed an EOA in August 2009. All 74 documented discrepancies have been resolved. An Operational Assessment was recently completed (February 3rd, 2012) prior to lead ship acceptance. The OA report will be delivered in May 2012. The USCG has also scheduled an IOT&E in 1QFY13 to support an ADE-3 (full production) decision.

Appendix C

Comparison of Island-Class Patrol Boat and Fast Response Cutter

Attribute	110' Island-Class Patrol Boat	154' Sentinel Class Fast Response Cutter
Service Life	20 years	20 years
Flank Speed	28 knots	28 knots
Fuel Endurance	1,900 nautical miles at 15 knots	2,500 nautical miles at 15 knots
Operational Tempo	1,800 operational hours per year.	2,500 operational hours per year
Seakeeping Capabilities (sea state) for Operations	Up to 8 feet	8.2 feet to 13 feet
Seakeeping Capabilities (sea state) for Survivability	Up to 15 feet	19.7 feet to 29.5 feet
Small Boat Launch System	Single-point crane boat launch and recovery	Stern ramp launch and recovery
	Minimum five-person operation	Maximum three-person operation
Command, Control, Communications, Computers, and Intelligence Suite	Stand-alone surface search radar, Automatic Identification System, Forward-Looking Infrared Radar, and electronic charting	SEAWATCH: Integrated charting, Automatic Identification System, radar, common shared tactical display, and enhanced electro-optical/infrared search system
	No Secret Internet Protocol Routing Network capability	Classified local area network with Secret Internet Protocol Routing chat messaging
	Stand-alone High Frequency, Very High Frequency, Ultra High Frequency communication.	Integrated external and internal voice communications suite
	Limited, short-term 128 Kilo bits per second underway connectivity	Full 256 Kilo bits per second underway 24/7 connectivity
Small Boat (Cutter Boat)	18'3" length, 7'5" beam	26' length, 9' beam
	Two-person crew. One traditional seat for operator with seating along air-filled sponson for an additional six.	Two-person crew. Shock-mitigated seating for five, additional four inside gunwales.
	28 knots maximum speed in calm seas	40 knots maximum speed in calm seas
	Handheld Very High Frequency voice communications only	Very High Frequency and High Frequency voice communications, integrated radar, and electronic charting
	Not normally operated out of cutter's sight due to limited communications and navigation capability.	200 nautical mile range. Capable of operating over the horizon from the cutter.
Combat Systems	One 25 millimeter cannon Mark38 Modification 1, crew-served weapon with traditional sight	One 25 millimeter cannon Mark38 Modification 2, gyro-stabilized remote-operated weapon with Electro-Optical/Infrared targeting sensor
	Two .50 caliber machine guns	Four .50 caliber machine guns
Crew Size	16	24
Independent Operation (number of days)	5 days	5 to 7 days

Appendix D
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Appendix E

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