



October 2020

COAST GUARD ACQUISITIONS

Opportunities Exist to Reduce Risk for the Offshore Patrol Cutter Program

Accessible Version

GAO Highlights

Highlights of [GAO-21-9](#), a report to congressional committees

Why GAO Did This Study

The Coast Guard—a component of the Department of Homeland Security (DHS)—is planning to spend over \$12 billion to acquire a fleet of 25 OPCs.

This is the component's highest investment priority and will help ensure a variety of missions, such as drug and migrant interdiction, are carried out in offshore waters once its aging Medium Endurance Cutters are decommissioned. After Hurricane Michael—a category 5 storm—significantly disrupted the OPC shipbuilder's ability to continue work in October 2018, DHS granted up to \$659 million in extraordinary contractual relief to the shipbuilder.

GAO was asked to review the status of the OPC acquisition program. This report examines, among other objectives, how the Coast Guard revised the OPC program after Hurricane Michael and the extent to which the program addressed major risks—particularly in the areas of design maturity, schedule, and cost—before proceeding through key acquisition decisions both pre- and post-hurricane. GAO reviewed Coast Guard program and contract documents, analyzed Coast Guard data, and interviewed Coast Guard and DHS officials.

What GAO Recommends

GAO is making eight recommendations to the Coast Guard and DHS, including ensuring that the program stabilizes its design before proceeding with construction of the next OPC, updates its schedule to address deficiencies and incorporate risks, and updates its cost estimate to improve its credibility.

View [GAO-21-9](#). For more information, contact Marie A. Mak at (202) 512-4841 or makm@gao.gov.

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Opportunities Exist to Reduce Risk for the Offshore Patrol Cutter Program

What GAO Found

The Coast Guard divided the Offshore Patrol Cutter (OPC) program into two stages and revised its cost and schedule goals following widespread disruptions from Hurricane Michael in October 2018, which led the shipbuilder to request relief from certain requirements under contract. Under this revised plan, the current shipbuilder will build up to four OPCs in the first stage, while the acquisition of the remaining 21 OPCs will be awarded under one or more new contracts starting in fiscal year 2022 in the second stage.

The Coast Guard's determination to deliver the OPCs in a timely manner has driven the program through key acquisition decisions despite significant design, testing, schedule, and cost risks, which remained or were exacerbated after the hurricane (see figure).

Offshore Patrol Cutter Program Moved Forward Despite Major Risks



Source: GAO analysis of Coast Guard information. | GAO-21-9

Unstable Design. The Coast Guard authorized the start of construction for the first two OPCs despite not having a stable design, which is inconsistent with shipbuilding best practices. Proceeding towards OPC 3 construction before stabilizing the design—including maturing the design drawings of major ship systems—increases the risk of construction rework if changes are needed. This could further delay schedules and increase costs.

Deficient and Optimistic Schedule. Prior to the construction award for OPC 1, the OPC program's schedule has contained significant deficiencies that are contrary to what is called for in best practices for developing schedules that GAO identified. Further, the revised post-hurricane delivery dates for the first four OPCs are optimistic and do not fully incorporate schedule risks, increasing the likelihood that the OPCs will not be delivered when promised.

Incomplete Cost Estimate. The cost estimate used to inform the program's new cost goals did not include key analyses called for in best practices for developing cost estimates GAO identified. These key analyses include varying assumptions to determine how sensitive the estimates are to various factors and quantifying the effects of potential risks. Omitting these analyses undermines the credibility of the estimated program costs, increasing the risk that decision makers do not have a complete picture of the full range of costs the program could incur.

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Abbreviations

ADE acquisition decision event

DCAA	Defense Contract Audit Agency
DCMA	Defense Contract Management Agency
DHS	Department of Homeland Security
DOD	Department of Defense
ESG	Eastern Shipbuilding Group
EVMS	earned value management system
FAR	Federal Acquisition Regulation
MEC	Medium Endurance Cutter
NAVSEA	Naval Sea Systems Command
OPC	Offshore Patrol Cutter
SLEP	service life extension program
TRL	technology readiness level

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October 28, 2020

The Honorable Peter A. DeFazio
Chairman
The Honorable Sam Graves
Ranking Member
Committee on Transportation and Infrastructure
House of Representatives

The Honorable Sean P. Maloney
Chairman
The Honorable Bob Gibbs
Ranking Member
Subcommittee on Coast Guard and Maritime Transportation
Committee on Transportation and Infrastructure
House of Representatives

The Coast Guard—a component within the Department Homeland Security (DHS)—plans to spend over \$12 billion over a period of 20 years to acquire a fleet of 25 Offshore Patrol Cutters (OPC), its highest investment priority and largest acquisition program. The OPCs will replace the aging fleet of Medium Endurance Cutters (MEC)—which are either approaching or have exceeded their design service lives—and enable the Coast Guard to conduct patrols for homeland security, law enforcement, and search and rescue operations. The Coast Guard selected Eastern Shipbuilding Group (ESG) as OPC’s shipbuilder, exercising ESG’s contract option for detail design in September 2016 and the option for construction of the first OPC in September 2018.¹ In October 2018, as ESG was about to begin construction on the first OPC, Hurricane Michael devastated the shipyard and the surrounding area in Panama City, Florida. Determining it was no longer able to perform to the terms of the contract, ESG requested both schedule relief and cost relief—an adjustment to the contract price for increased costs—from the Coast Guard. In October 2019, DHS, after coordinating with the Coast Guard, granted extraordinary contractual relief to ESG for national

¹A contract option allows the government, for a specified period of time, to purchase additional supplies or services as specified in the contract, or to extend the term of the contract. The government may unilaterally elect not to award or exercise a contract option.

defense purposes in accordance with Public Law 85-804.² DHS authorized up to \$659 million in cost relief to ESG for production of up to the first four OPCs and directed the Coast Guard to recomplete the requirement for the remaining 21 cutters as expeditiously as possible.³ According to DHS, the relief granted to ESG was the first time in the department's history that DHS used its extraordinary contractual authority.

You asked us to review the status of the OPC acquisition program and the Coast Guard's plans for the MECs. This report examines (1) how the Coast Guard revised the OPC program after Hurricane Michael, (2) the extent to which the OPC program addressed major risks before proceeding through key acquisition decisions both pre- and post-hurricane, and (3) how the Coast Guard plans to mitigate the potential capability gap between end of service life for the MECs and the delivery of the OPCs.

To determine how the Coast Guard revised the OPC program after Hurricane Michael, we reviewed revisions to ESG's detail design and construction contract; OPC's April 2012, September 2014, and March 2020 acquisition program baselines; DHS's documentation of the analysis performed leading up to the memorandum authorizing extraordinary contractual relief; and documentation related to the planned recomplete of the requirement for OPCs 5 through 25. We also determined the extent to which the OPC program's revised baselines includes key milestones for oversight by reviewing the milestones included in the March 2020 acquisition program baseline, DHS acquisition policy, and acquisition program baselines for other major shipbuilding programs in the Coast Guard and the Navy. We also interviewed officials from OPC's program office, and the Coast Guard's contracting office, and representatives from ESG.

²See Pub. L. No. 85-804, codified at 50 U.S.C. § 1431. Executive Order 10789, as amended by Executive Order 13286, implements and authorizes the Secretary of DHS to use the authority. The extraordinary contractual authority authorizes the Secretary of DHS to modify contracts without regard to other provisions of law related to making, performing, amending, or modifying contracts, whenever such action would facilitate national defense.

³For the purposes of this report, we use the agencies' terminology of "recomplete" to refer to the competitive award of new contracts for OPCs 5 through 25. ESG's contract originally included options for up to 9 OPCs; OPCs 10 through 25 were to be acquired through a full and open competition.

To assess the extent to which the OPC program addressed major risks before proceeding through key acquisition decisions both pre- and post-hurricane, we assessed five key areas:

- design maturity,
- cost estimates and risks,
- schedule estimates and risks,
- contractor business systems, and
- the program's risk management approach.

We determined the extent to which these five key areas were present at any of the following three key acquisition decisions DHS approved for the OPC program: (1) lead ship construction start in September 2018, which was pre-hurricane; (2) extraordinary contractual relief in October 2019, which was post-hurricane; and (3) OPC 2 construction start and rebaselining in March 2020. We evaluated the program's efforts in these key areas against selected best practices we identified in prior work for shipbuilding, in GAO's Schedule Assessment Guide, and in GAO's Cost Assessment Guide; DHS acquisition policy; and Coast Guard acquisition policy and guidance.⁴ We supplemented our analysis by interviewing representatives from the OPC program office, OPC's ship design team, ESG, Defense Contract Audit Agency (DCAA), Defense Contract Management Agency (DCMA), U.S. Navy's Naval Sea Systems Command's Cost Engineering and Industrial Analysis Group (NAVSEA 05C), DHS contract adjustment board, DHS Cost Analysis Division, and DHS Program Accountability and Risk Management.

To determine how the Coast Guard plans to mitigate the potential capability gap between end of service life for the MECs and the delivery of the OPCs, we reviewed MEC service life extension program (SLEP) and OPC acquisition documents, among other documents. We also

⁴GAO, *Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Program Costs*, [GAO-20-195G](#) (Washington, D.C.: Mar. 12, 2020); *Schedule Assessment Guide: Best Practices for Project Schedules*, [GAO-16-89G](#) (Washington, D.C.: Dec. 22, 2015); and *Best Practices: High Levels of Knowledge at Key Points Differentiate Commercial Shipbuilding from Navy Shipbuilding*, [GAO-09-322](#) (Washington, D.C.: May 13, 2009); Coast Guard Commandant Instruction Manual 5000.10F, Major Systems Acquisition Manual (Sept. 16, 2019); Coast Guard Acquisition Directorate (CG-9), Standard Operating Procedure No. 7, Program Risk Management and Mishap Risk Management (Nov. 8, 2016); Department of Homeland Security (DHS), DHS Acquisition Management Directive 102-01, Rev. 03.1 (Feb. 25, 2019); and DHS Acquisition Management Instruction 102-01-001, Rev. 01.1 (May 3, 2019).

analyzed fiscal years 2014 through 2019 MEC data from the Coast Guard's Electronic Asset Logbook database to determine mission capability rates for both the 210-foot and 270-foot MEC fleets. We reviewed data standards and guidance for the Electronic Asset Logbook database and interviewed Coast Guard officials to determine that the data were sufficiently reliable for the purposes of reporting the MEC mission capability rates from fiscal year 2014 through 2019. We also analyzed Coast Guard's depot maintenance costs from fiscal year 2010 through 2019. We supplemented our analysis by interviewing officials from the MEC SLEP program office and the Coast Guard's engineering directorate.

Appendix I presents a more detailed description of the objectives, scope, and methodology for our review.

We conducted this performance audit from September 2019 to October 2020 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.

Background

History of the MECs and Potential Capability Gap

The current Coast Guard fleet includes 14 210-foot and 13 270-foot MECs, most of which have exceeded their design service life of 30 years.⁵ Both classes of MECs are deployed for a wide range of mission operations, including search and rescue; interdicting illegal drugs and migrants; enforcing fishing laws; and securing ports, waterways, and coastal areas. Figure 1 includes photos of the 210-foot and 270-foot MECs.

⁵The Coast Guard's MEC fleet also includes a 282-foot MEC, *Alex Haley*, which was originally commissioned as a U.S. Navy vessel in 1971 and then reinstated as a Coast Guard cutter in 1999.

Figure 1: The Coast Guard's 210-Foot and 270-Foot Medium Endurance Cutters
**U.S. Coast Guard 210-Foot Medium Endurance Cutter****U.S. Coast Guard 270-Foot Medium Endurance Cutter**

Source: United States Coast Guard, Petty Officer 3rd Class Joshua Canup, and United States Coast Guard District 1. | GAO-21-9

Due to their age, the condition of the MECs has diminished and they are facing increasing obsolescence. For many of the MECs' systems, the original manufacturer no longer makes replacement parts, such as the generators, fire pumps, and other auxiliary equipment. To help sustain the MECs, the Coast Guard conducted three major recapitalization and maintenance efforts between 1987 through 2014. However, in July 2012, we found that the MECs were expensive to maintain and prone to failures, which hindered their operational capacity to meet mission requirements.⁶ We also found in 2012 that the Coast Guard was facing an operational capability gap as the service life of the MECs was estimated to end before the upgraded and more capable OPCs were scheduled to be delivered starting in 2020.⁷

In July 2018, we found that maintaining the MECs continued to be a challenge due to age and obsolescence.⁸ At that time, to address the risk of an operational capability gap until the OPCs could join the fleet, the Coast Guard planned to conduct a SLEP to extend the service lives of the

⁶GAO, *Coast Guard: Legacy Vessels' Declining Conditions Reinforce Need for More Realistic Operational Targets*, [GAO-12-741](#) (Washington, D.C.: July 31, 2012).

⁷The 2013 Coast Guard Financial Resource Management Manual (COMDTINST M7100.3E) changed the definition of the service life of assets so that the service life can no longer change unless a service life extending improvement project occurs or a follow-on engineering analysis is conducted that supports the amendment of the Service Life. As a result, the estimated service lives for MECs that GAO reported in 2012 no longer apply.

⁸GAO, *Coast Guard Acquisitions: Actions Needed to Address Longstanding Portfolio Management Challenges*, [GAO-18-454](#) (Washington, D.C.: July 24, 2018).

270-foot MECs but had not determined how many of the 13 cutters would undergo the SLEP. We noted in 2018 that under this plan, all of the 210-foot MECs and possibly some of the 270-foot MECs would still need to operate well past their original service lives until they were replaced.

OPC Program's Mission, Acquisition Framework, and History

In January 2008, the Coast Guard established the OPC program's mission needs, which generally include the same range of mission operations as the MECs, including search and rescue and interdicting drugs and migrants.⁹ Designed for long-distance transit, extended on-scene presence, and operations with deployable aircraft and small boats, the OPCs are intended to provide the majority of offshore presence for the Coast Guard's cutter fleet. The OPCs are intended to bridge the operational capability gap between the National Security Cutters, which patrol the open ocean, and the Fast Response Cutters, which serve closer to shore. Figure 2 is the shipbuilder's rendering of the OPC.

⁹The OPC program was separated out from the Coast Guard's former Deepwater acquisition program, which began in the late 1990s and was intended to recapitalize surface, air, and information technology capacity. We reported on significant acquisition challenges with the former Deepwater program until 2007, when the Coast Guard divided the Deepwater program into individual acquisition programs, including the OPC program.

Figure 2: Rendering of the Coast Guard's Offshore Patrol Cutter

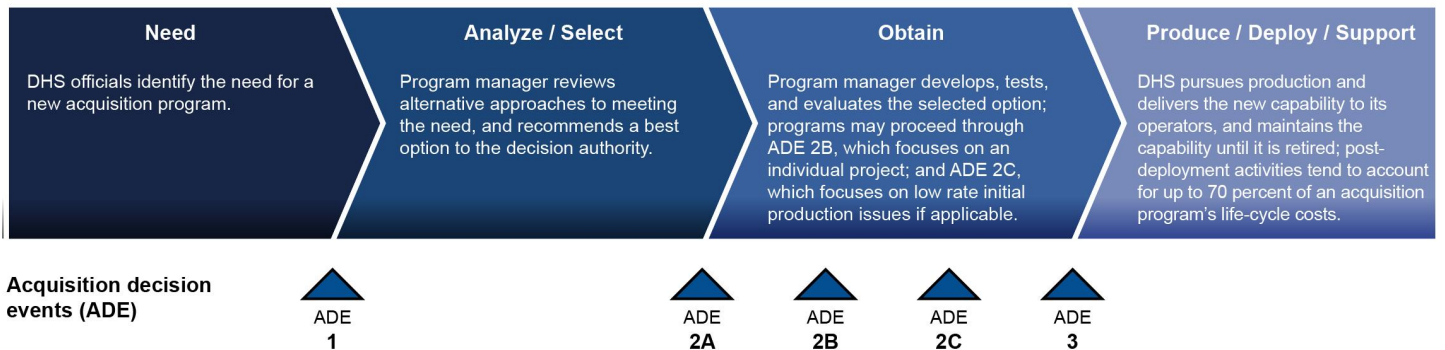


Source: © 2016 Eastern Shipbuilding Group, Panama City, Florida. | GAO-21-9

The Coast Guard manages and oversees the OPC program using DHS's acquisition framework.¹⁰ DHS's acquisition policy establishes that a major acquisition program's decision authority shall review the program at a series of predetermined acquisition decision events (ADE) to assess whether the major program is ready to proceed through the acquisition life-cycle phases (see figure 3).

Figure 3: Overview of the DHS's Acquisition Framework for Major Acquisition Programs

Acquisition phases



Source: GAO analysis of Department of Homeland Security (DHS) data. | GAO-21-9

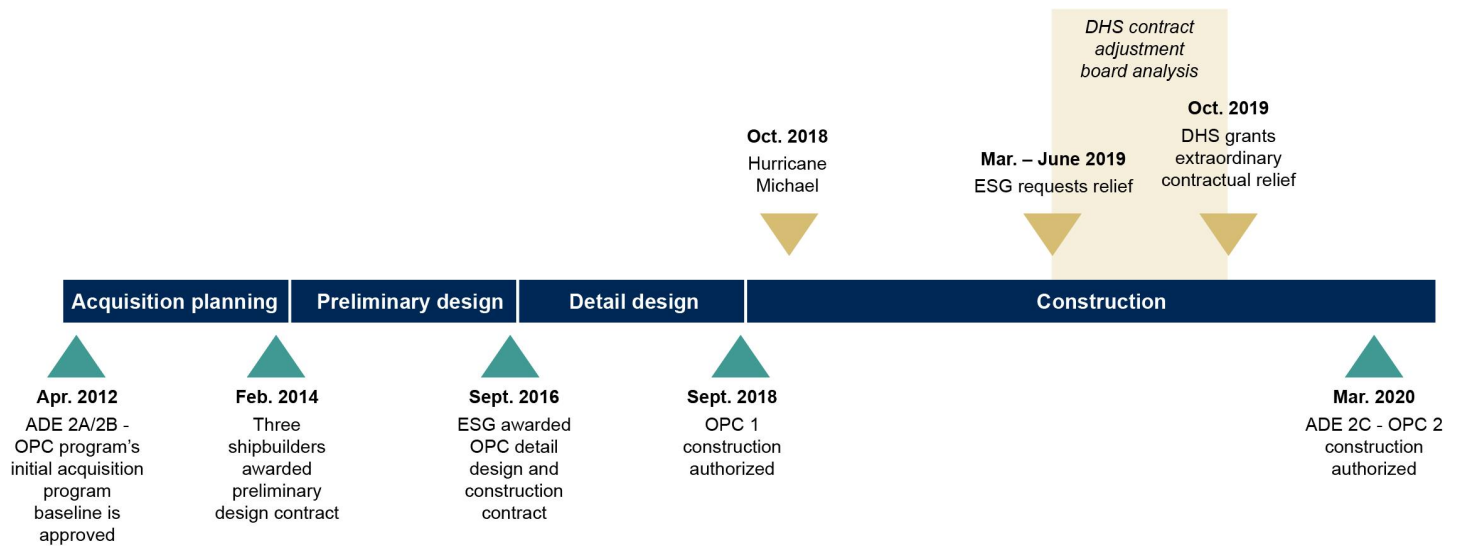
¹⁰As a component within DHS, the Coast Guard is required to follow DHS's acquisition policies. Some DHS guidance is broad and allows programs to tailor requirements as needed.

The DHS Under Secretary for Management has final decision authority for the OPC's ADEs as the acquisition decision authority while the Vice Commandant of the Coast Guard serves as the component acquisition executive, the senior acquisition official within the Coast Guard.

DHS acquisition policy establishes that the acquisition program baseline is the fundamental agreement between programs, component, and department-level officials establishing what will be delivered, how it will perform, when it will be delivered, and what it will cost. Specifically, the program baseline establishes a program's schedule, costs, and key performance parameters, and covers the entire scope of the program's life cycle. The acquisition program baseline establishes objective (target) and threshold (maximum acceptable for cost, latest acceptable for schedule, and minimum acceptable for performance) baselines. According to DHS policy, if a program fails to meet any schedule, cost, or performance threshold approved in the acquisition program baseline, it is considered to be in breach.

Figure 4 provides an overview of selected key events for the OPC program from April 2012, when the program achieved ADE 2A/2B, through March 2020, when the program achieved ADE 2C.

Figure 4: Selected Major OPC Acquisition and Hurricane-Related Milestones from April 2012 through March 2020



ADE = Acquisition decision event
 ESG = Eastern Shipbuilding Group
 DHS = Department of Homeland Security
 OPC = Offshore Patrol Cutter

Source: GAO analysis of Coast Guard information. | GAO-21-9

Additional details on selected key OPC events are outlined below:

- In September 2016, the Coast Guard selected ESG from among those contractors previously awarded preliminary design contracts to proceed with detail design by exercising ESG’s contract option. ESG’s contract included fixed-price incentive (firm-target) options for up to nine OPCs total, valued at \$2.4 billion if all options were exercised.¹¹ The fixed-price incentive contract type generally fixes the government’s maximum obligation to pay at a ceiling price, which is negotiated at the outset of the contract.
- In October 2018, Hurricane Michael—a category 5 storm—made landfall in the Panama City, Florida area causing widespread damage to the shipbuilder’s facilities, significant disruption to its

¹¹The Coast Guard had planned to conduct a full and open competition to award at least one other contract for construction of OPCs 10 through 25. Generally, the fixed-price incentive (firm-target) contract type allows the government and shipbuilder to share cost savings and risk. See Federal Acquisition Regulation (FAR) § 16.403-1. For additional information on how the Navy has used fixed-price incentive contracts for its shipbuilding programs, see GAO, *Navy Shipbuilding: Need to Document Rationale for the Use of Fixed-Price Incentive Contracts and Study Effectiveness of Added Incentives*, GAO-17-211 (Washington, D.C.: Mar. 1, 2017).

workforce, and depletion of its financial working capital. ESG determined that it could no longer perform to the terms of the contract and as a result, requested schedule relief in March 2019 and cost relief of \$740.3 million for OPCs 1 through 9 in June 2019.

In October 2019, the Acting Secretary of DHS determined it was in the best interest of the government to use DHS's extraordinary contractual authority to grant up to \$659 million in relief to ESG for continued performance on the contract for up to just the first four OPCs. The Acting Secretary further directed the program to recomplete the requirement for OPCs 5 through 25 as expeditiously as possible.

Coast Guard Made Changes to the OPC Program to Address Hurricane Michael's Effects but Has Limited Opportunities for Oversight in the Near Term

DHS established a contract adjustment board to evaluate the impacts of the hurricane on ESG and the OPC program, which informed the Acting Secretary's decision to grant extraordinary contractual relief. In accordance with the relief DHS granted to ESG, the Coast Guard rebaselined cost and schedule goals for the OPC program in March 2020. As part of the rebaselining, the Coast Guard divided the program into two stages:

- Construction of up to the first four OPCs by ESG under stage 1, and
- Recompeting the requirement for OPCs 5 through 25 under stage 2.

The Coast Guard has revised the schedule baselines for stage 1. In doing so, the Coast Guard delayed the next acquisition milestone—completion of initial operational testing—by 21 months, to September 2025. As a result, the program will not have another milestone for stage 1 for over 5 years after the previous milestone—ADE 2C in March 2020—which decreases opportunities for oversight should any additional delays occur. The 5-year gap without milestones is partly due to the OPC program not including its ship delivery dates in its acquisition program baseline. The Coast Guard has established preliminary schedule baselines for stage 2

of the program and similarly did not include ship delivery dates, resulting in periods of time without milestones for this stage.

DHS and the Coast Guard Determined Use of Extraordinary Contractual Authority Was the Best Option to Ensure Timely Delivery of OPCs

DHS's granting of extraordinary contractual relief in response to ESG's June 2019 request enabled the Coast Guard to modify its contract with ESG, generally without regard to other provisions of federal contract law.¹² Before the Acting Secretary of DHS was able to grant this relief, he was required by federal acquisition regulations to determine that certain conditions were met, such as that the granting of relief would facilitate national defense and that other legal authorities within the agency were inadequate.¹³ Specifically, the Coast Guard determined that it could not provide post-hurricane cost relief to ESG under the terms of the contract. For example, the Coast Guard examined different contract finance options, such as advance payments, and converting the contract type from a fixed-price incentive (firm-target) to other contract types, including cost reimbursement. However, the Coast Guard ultimately determined these options would not fully address ESG's post-hurricane challenges and were not feasible under the terms of the contract without receiving something of commensurate value from ESG in return—which the Coast Guard deemed the shipbuilder could not provide.

To evaluate its options, DHS established a contract adjustment board, comprised of representatives from DHS, the Coast Guard, NAVSEA 05C, and financial consultants.¹⁴ The board analyzed whether and how much extraordinary contractual relief should be granted to ESG. From July to October 2019, the board examined OPC's post-hurricane costs and schedule considerations; ESG's financial viability, required working

¹²See Pub. L. No. 85-804, § 1 (Aug. 28, 1958), codified at 50 U.S.C. § 1431.

¹³FAR § 50.102-3(b).

¹⁴An agency head may establish a contract adjustment board with authority to approve, authorize, and direct appropriate actions under extraordinary contractual authority. FAR § 50.102-2. For the purposes of our review, the DHS contract adjustment board refers to the board as well as the various extraordinary contractual relief assessment teams, including the overall assessment, initial assessment, program assessment (schedule, producibility, operational, proposal cost, government cost), business assessment (corporate finance and contract terms and conditions), and senior review teams.

capital, and risk to insolvency; ESG's ability to produce the nine OPCs on its contract, including ramping up production to two OPCs per year starting with OPC 5; and the terms and conditions of the contract. The board determined that ESG's June 2019 request met the conditions necessary to grant the relief.¹⁵

The board then compared the option of granting the relief to two other options: (1) providing no relief, terminating ESG's contract, and recompeting the requirement for all nine OPCs; and (2) a hybrid approach of granting partial relief to ESG for just four OPCs and a recompetes of the requirement for the remaining OPCs.

The DHS contract adjustment board developed the hybrid partial relief option after determining there was a high risk that ESG would not be able hire a sufficient number of skilled laborers to ramp up production to two OPCs per year after OPC 4. In determining the amount of relief to provide ESG post-hurricane, the board found ESG's request for extraordinary relief to be underestimated, citing concerns such as the board's inability to validate the accuracy of the shipbuilder's cost models and significantly underestimated labor hours. As a result, the board used NAVSEA 05C's cost models to develop a conservative estimate, which was the basis for determining the maximum amount of relief necessary.

Comparing the costs and delivery dates of each option, the board concluded that while the hybrid partial relief approach was the highest cost option, it also offered the most likely opportunity for the OPCs to be delivered faster. The board also noted that given the close nature of the estimates and the uncertainty associated with the range of assumptions, it was not possible to conclude with certainty that one option was less costly than the other. Based on the board's analysis, the Acting Secretary of DHS granted extraordinary contractual relief to ESG, citing ESG's production of OPCs as essential to national defense and that significant

¹⁵The DHS contract adjustment board analyzed whether the OPC contract met the conditions set forth in Pub. L. No. 85-804, § 1, codified at 50 U.S.C. § 1431 and implemented in FAR part 50. Specifically, the board determined (1) whether the contractor suffered an actual or threatened loss, however caused, that impaired the contractor's ability to perform a contract that is essential to national defense, (2) whether granting of relief would facilitate national defense, (3) that other legal authority within the agency was deemed to be lacking or inadequate, (4) that request for relief was filed before all obligations under the contract had been discharged, (5) that relief would be limited to the amounts appropriated and the statutory contract authorization, and (6) that notification to congressional committees in writing for relief that would obligate funds in excess of \$34 million was transmitted and that 60 days of continuous congressional session had passed before obligating funds. See FAR § 50.102-3.

delay in delivery of the OPC was unacceptable. The Acting Secretary authorized a maximum amount of \$659 million in extraordinary contractual relief for detail design and the construction of up to the first four OPCs, which allowed the Coast Guard to modify its contract with ESG to provide such relief.

The Coast Guard Modified the Shipbuilder's Contract to Delay Deliveries and Provide Extraordinary Contractual Relief, which Resulted in Increased Prices

As of May 2020, the Coast Guard used the granted relief to increase ESG's contract ceiling price for detail design and construction of the first two OPCs by 38 percent, from \$779 million to \$1.07 billion.¹⁶ In July 2020, Coast Guard officials told us that they plan to modify the contract prices for OPCs 3 and 4 by no later than June 2021 and June 2022, respectively.

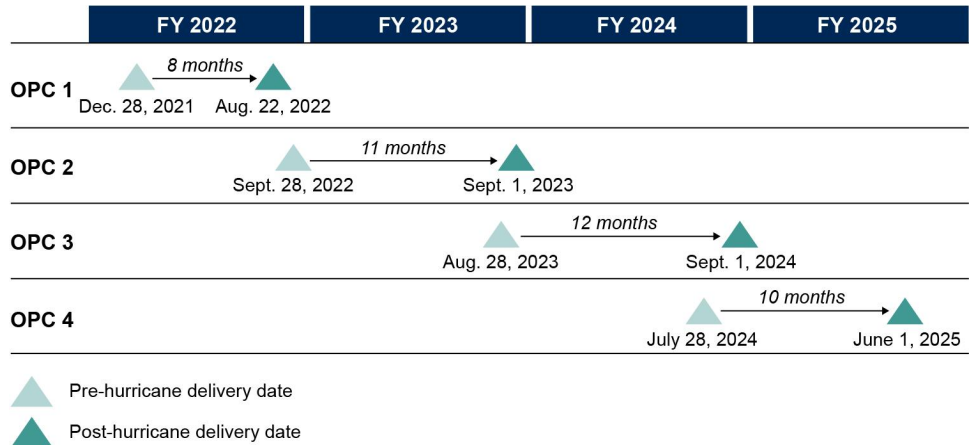
The Acting Secretary based the relief amount in part, on the DHS contract adjustment board's corporate finance analysis, which determined that it was necessary to provide ESG with cash infusions to restore ESG's working capital, which were depleted as a result of the hurricane, to prevent ESG's financial insolvency. In February 2020, the Coast Guard provided ESG with a \$21 million cash infusion to help address this risk.

In response to ESG's March 2019 request for schedule relief, the Coast Guard delayed the delivery dates of OPCs 1 through 4 from 8 to 12 months as an excusable delay under the contract due to the hurricane (see figure 5).¹⁷

¹⁶The OPC contract ceiling price includes construction, long lead time materials, and support items and services. We did not include costs associated with preliminary contract design or hull form licenses in the OPC contract ceiling price.

¹⁷ESG's detail design and construction contract includes an excusable delays clause, which generally states the contractor shall not be in default because of any failure to perform under contract terms if the failure arises from causes beyond the control and without the fault or negligence of the contractor. Examples of these causes include acts of God, fires, floods, epidemics, quarantine restrictions, strikes, and unusually severe weather. If the contracting officer determines that the contractor's failure to perform is a result of one or more of these causes, the delivery schedule shall be revised. FAR § 52.249-14. Coast Guard officials stated that they plan to specify delivery dates for OPCs 3 and 4 in ESG's contract by no later than June 2021 and June 2022, respectively.

Figure 5: Delayed Delivery Dates for Coast Guard's OPCs 1 through 4 as a Result of October 2018 Hurricane



FY = Fiscal year
 OPC = Offshore Patrol Cutter

Source: GAO analysis of Department of Homeland Security and Coast Guard information. | GAO-21-9

Coast Guard Revised the Baseline for First Four OPCs and Plans to Recompete the Requirement for the Remainder, but the Next Acquisition Milestone Is Several Years Away

With the decision to grant relief to ESG and recomplete the requirement for OPCs 5 through 25, in March 2020, the Coast Guard rebaselined the OPC program and divided it into two stages, with stage 1 consisting of OPCs 1 through 4 and stage 2 consisting of OPCs 5 through 25.

For the new stage 2 competition, the Coast Guard plans to conduct a full and open competition. According to the Coast Guard, the request for proposals for the contract is planned for release by the end of December 2020. Contractor proposal submissions would be due by the end of May 2021, and contract award is planned to take place in January 2022. The Coast Guard plans to establish a separate acquisition program baseline for OPCs 5 through 25 at an ADE 2B in fiscal year 2022. To promote a competitive environment for the next award and inform the request for proposals, in March 2020, the Coast Guard awarded industry study

contracts worth up to a total of \$22 million to eight shipyards.¹⁸ Under these contracts, the shipyards will review ESG’s existing design and recommend potential strategies to complete OPC’s detail design at a low risk; identify any recommended design revisions and design risks; and complete other tasks related to analyzing OPC’s costs and schedule.

The Coast Guard plans to use the industry study results to inform the extent to which the design will be standardized between the first four OPCs and the rest of the fleet. Coast Guard officials told us that a more common design across the fleet would likely result in long-term savings in operations and maintenance costs. However, the officials acknowledged that long-term savings must be balanced against the need to provide shipbuilders flexibility in their proposed designs to maximize pricing competition and minimize life cycle cost and risk to the government. Our review of industry’s input on the Coast Guard’s plans to recompute the requirement for OPCs 5 through 25 found that certain industry partners raised concerns about using ESG’s design, stating that the Coast Guard would be providing the incumbent an advantage. These industry partners also noted that this approach created technical, cost, and schedule risks because any potential rework to address design deficiencies could be costly and fall under the responsibility of the non-incumbent shipbuilder.

Since the OPC program set its initial cost baseline in 2012, estimated costs for the 25-cutter program have grown, with most of the growth occurring post-hurricane (see table 1).

Table 1: Estimated Acquisition Costs for Offshore Patrol Cutter (OPC) Program in 2012, 2018, and 2020

in Then-Year Billions of Dollars

Category	2012 cost estimate	2018 pre-hurricane cost estimate	2020 post-hurricane cost estimate	Percent change from 2018 to 2020
OPC costs funded by program	10.5 ^a	10.3	12.7	23
OPC costs not funded by program ^b	2.0	3.9	4.3	10
OPC total acquisition costs	12.5	14.2	17.0	20

Source: GAO analysis of Coast Guard information. | GAO-21-9

¹⁸The Coast Guard awarded the eight industry study contracts, each valued at potentially \$1 to \$3 million, to Austal USA, LLC of Mobile, Alabama; Bath Iron Works of Bath, Maine; Bollinger Shipyards Lockport, LLC of Lockport, Louisiana; Eastern Shipbuilding Group, Inc. of Panama City, Florida; Fincantieri Marinette Marine of Marinette, Wisconsin; Huntington Ingalls, Inc. of Pascagoula, Mississippi; Philly Shipyard, Inc. of Philadelphia, Pennsylvania; and VT Halter Marine, Inc. of Pascagoula, Mississippi.

Note: The costs for the OPC program include acquisition of 25 cutters and do not include operations and maintenance costs.

^aThe OPC program set the objective cost in the 2012 acquisition program baseline at the 2012 cost estimate. Per DHS acquisition policy, the threshold cost is 15 percent higher than the objective cost, which resulted in a threshold cost of \$12.1 billion. The 2014 acquisition program baseline reflected the same objective and threshold costs as the 2012 acquisition program baseline.

^bThese costs include non-OPC funded government furnished equipment costs funded by the Navy as well as non-OPC funded outfitting and post-delivery, facilities acquisition, and personnel costs funded by the Coast Guard.

Based on the 2020 cost estimate update, the Coast Guard set the OPC program's threshold cost baseline for stage 1 and plans to finalize the baselines for stage 2 in 2022.¹⁹ Because the program set the cost baseline only for the first four OPCs, the program does not currently have finalized cost baselines covering the entire program of record. Coast Guard officials explained that stage 2 is being managed as a separate programmatic effort and that finalizing a cost baseline was premature.

The Coast Guard also revised the program's schedule baselines for stage 1. In doing so, the Coast Guard delayed three acquisition milestones from those in the 2014 acquisition program baseline. Specifically:

- ADE 2C—which corresponds to the authorization of OPC 2 construction start for the program—was delayed from December 2019 to March 2020. As a result, in December 2019, DHS declared the OPC program had breached its schedule baseline. When the program achieved ADE 2C in March 2020, DHS removed the OPC program from breach status.
- Completion of initial operational testing was delayed by 21 months, to no later than September 2025.
- Initial operational capability was delayed by 18 months, to no later than September 2025.²⁰

As a result, the OPC program's next acquisition milestone for stage 1, completion of initial operational testing, is over 5 years after the previous milestone—ADE 2C. According to DHS acquisition policy, programs in schedule breach—generally, when a program fails to achieve a milestone by the threshold date in the acquisition program baseline—are required to

¹⁹Specific information on costs for stages 1 and 2 were omitted because the information was deemed sensitive by the Coast Guard.

²⁰Initial operational capability for the OPC program is defined as attainment of operational capability on the first ship.

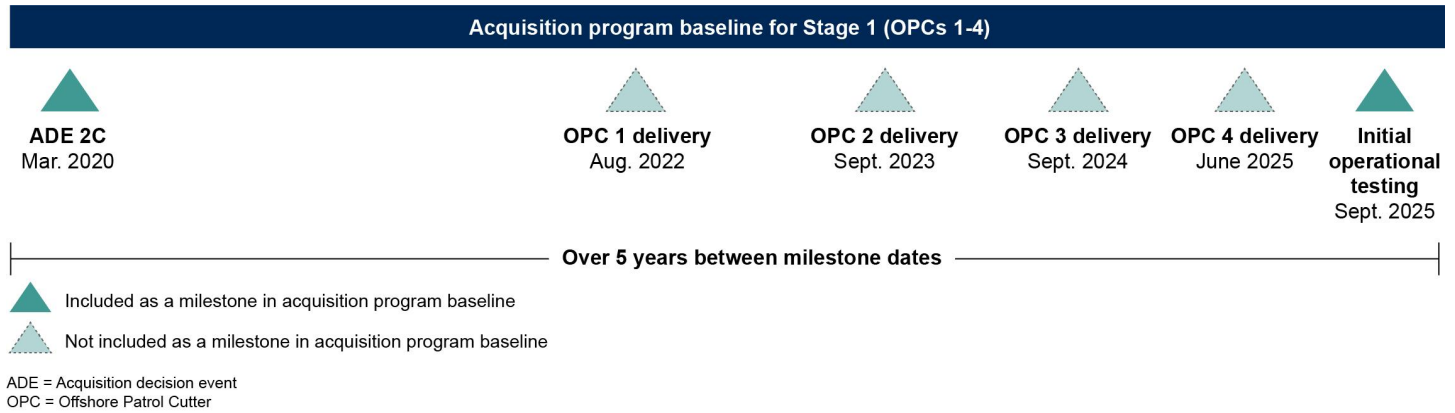
notify their acquisition decision authority and component acquisition executive and develop a remediation plan.²¹ In addition to DHS's requirements for breach notifications, the Coast Guard's major acquisition programs have additional requirements to report breaches that meet a certain threshold. The Coast Guard must report these breaches to appropriate congressional committees in accordance with Title 14 of the U.S. Code.²² As a result, if the OPC program is delayed and breaches an acquisition milestone, it must notify the DHS Under Secretary for Management, Vice Commandant of the Coast Guard, and potentially congressional decision makers, which helps to ensure oversight and hold the program accountable for schedule delays.

Interim events, such as OPC delivery dates, are not included in the program's stage 1 acquisition program baseline as milestones (see figure 6).

²¹We have previously found that the remediation plan should outline a time frame for the program to 1) return to its acquisition program baseline parameters, (2) rebaseline—that is, establish new schedule, cost, or performance goals—or 3) have a DHS-led program review that results in recommendations for a revised baseline. GAO, *Homeland Security Acquisitions: Outcomes Have Improved but Actions Needed to Enhance Oversight of Schedule Goals*, [GAO-20-170SP](#) (Washington, D.C.: Dec. 19, 2019).

²²Title 14 of the U.S. Code requires the Coast Guard to report to the House Committee on Transportation and Infrastructure and Senate Committee on Commerce, Science, and Transportation as soon as possible, but not later than 30 days, after the Coast Guard becomes aware of cost and schedule breaches that exceed certain the thresholds set in the acquisition program baselines for Level 1 or 2 programs. The reporting requirement is triggered when Coast Guard becomes aware of an acquisition program baseline breach that involves a likely cost overrun of greater than 15 percent or a likely delay of more than 180 days in the delivery schedule for any Level 1 or 2 program. 14 U.S.C. § 1135. See also 14 U.S.C. § 1171.

Figure 6: OPC Program’s Acquisition Program Baseline for Stage 1 Does Not Include Delivery Dates



Source: GAO analysis of Coast Guard information. | GAO-21-9

Note: While the inclusion of delivery dates in an acquisition program baseline is not expressly required by DHS acquisition policy, the policy does require inclusion of “key events.”

The Coast Guard has also established preliminary schedule baselines for the 21 OPCs in stage 2, with plans to hold a production readiness review for OPC 5—the first of the OPCs that will be competed—by December 2023.²³ The stage 2 preliminary baseline similarly does not include the OPC delivery dates, which are notionally scheduled between fiscal years 2026 and 2037. Without including the delivery dates for OPCs 5 through 25 in the baselines, even preliminarily, stage 2 will not have acquisition milestones for several years.

DHS acquisition policy states that acquisition program baselines should include dates for ADEs, initial operational capability, full operational capability, and additional “key events” as necessary for the program. These key events can provide interim steps to gauge program progress and facilitate oversight.²⁴ Unlike the OPC program, other current Coast Guard cutter acquisition programs—including the Fast Response Cutter, National Security Cutter, and Polar Security Cutter—included selected ship delivery dates, such as those for the lead or final ship, as key events in their acquisition program baselines. Further, the Navy uses ship

²³According to the OPC program’s systems engineering plan, the production readiness review is conducted to assess the shipbuilder’s manufacturing facilities and processes and confirm the shipbuilder’s capability to produce a cutter in a production representative environment.

²⁴Although not defined in DHS acquisition policy, “key events” are described as including, for example, capability based releases, development events, and operational test and evaluation, among other things.

delivery dates for shipbuilding programs as schedule metrics.²⁵ For example, Navy shipbuilding programs such as the DDG 51 destroyers, DDG 1000 destroyers, and SSN 774 Virginia class submarines have included delivery dates in their acquisition program baselines or annual selected acquisition reports provided to Congress.²⁶

Coast Guard officials stated that they have monthly meetings with DHS to monitor the OPC program and provide quarterly briefings to congressional oversight committees on the status of the program. However, including OPC ship delivery dates as interim key events in the acquisition program baselines will provide increased program accountability since the failure to meet those dates triggers specific reporting requirements. As a result, DHS leadership, Coast Guard leadership, and congressional oversight committees will then have increased visibility into potential delivery delays.

OPC Program Lacks Stable Design, Realistic Schedule, Fully Informed Cost Estimate, and Effective Risk Management

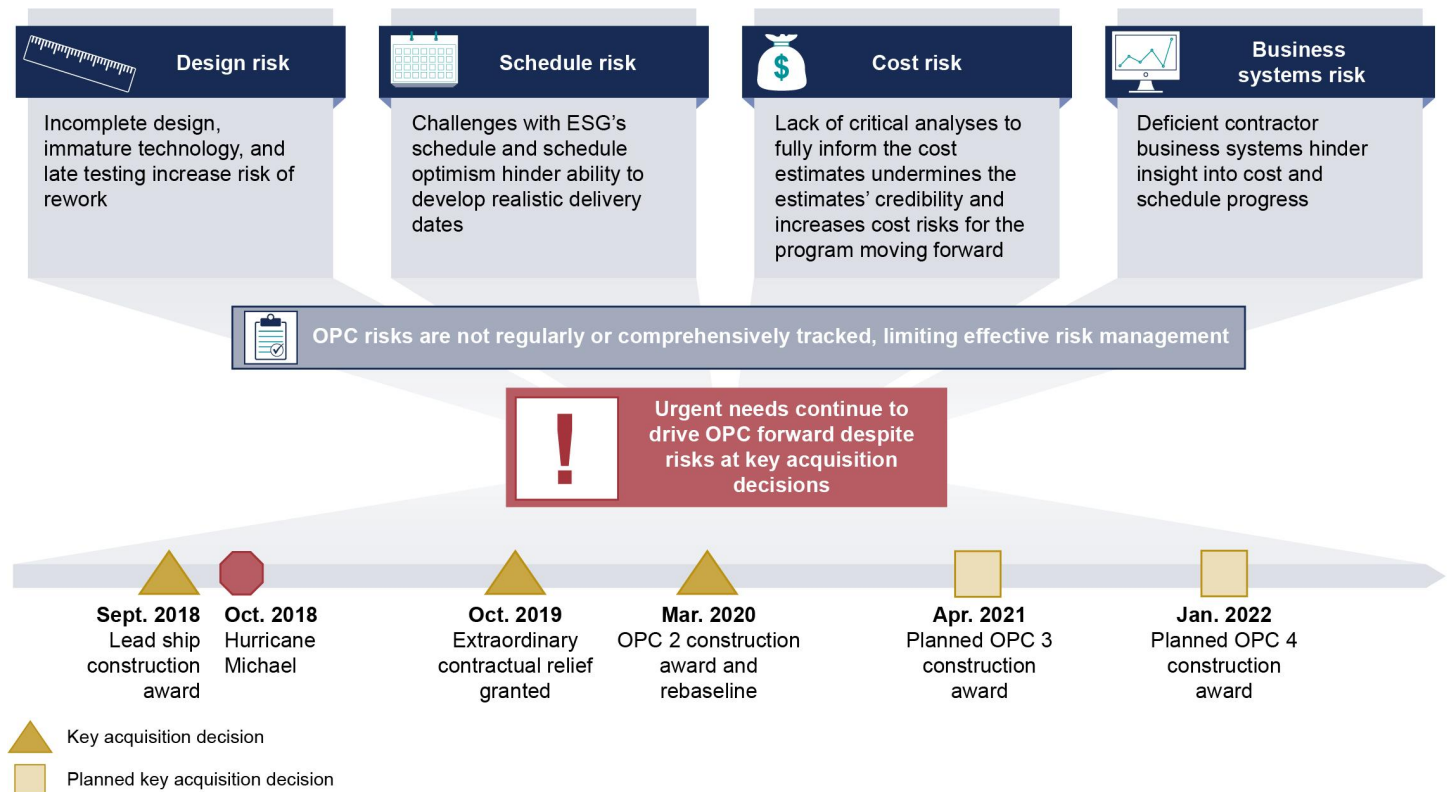
The OPC program faced a number of program risks before the Coast Guard awarded construction of OPC 1 in September 2018, a month before Hurricane Michael. However, since the hurricane, these risks have been carried forward and in some cases exacerbated. We found that the program faces risks in three key areas: (1) design and testing, (2) schedule and (3) cost. Further, ESG's deficient business systems limited Coast Guard's insight into the program's cost and schedule progress. Additionally, the program's lack of a comprehensive risk management

²⁵See GAO, *Navy Shipbuilding: Past Performance Provides Valuable Lessons for Future Investments*, [GAO-18-238SP](#) (Washington, D.C.: June 6, 2018).

²⁶The Department of Defense's (DOD) selected acquisition reports are statutorily-required reports that provide information on the cost, schedule and performance of certain DOD weapon systems in comparison with baseline values. 10 U.S.C. § 2432. The National Defense Authorization Act for Fiscal Year 2020 removed the requirement for DOD to submit selected acquisition reports after DOD's final submissions covering fiscal year 2021. Pub. L. No. 116-92, Div. A, Title VIII § 830(a) (Dec. 20, 2019). The conference report accompanying the National Defense Authorization Act for Fiscal Year 2020 requires DOD to submit to the congressional defense committees by October 15, 2020 a proposal for an alternative methodology for reporting on all acquisition programs that includes the most recent changes to DOD's acquisition policy, the prior selected acquisition report reporting requirements, and reporting requirements for acquisition programs that use alternative or tailored acquisition procedures. H. Rept. No. 116-333 (Dec. 9, 2019).

process limits the program’s ability to effectively manage cost and schedule risks. Coast Guard officials have emphasized the urgent need to push forward with the OPC program to address the potential capability gap resulting from the aging MEC fleet and, more recently, to prevent ESG’s financial insolvency resulting from the hurricane. As such, the OPC program continued to move forward with key acquisition decisions despite these program risks (see figure 7).

Figure 7: OPC Program Moved Forward Despite Design, Cost, Schedule, and Oversight Risks



OPC = Offshore Patrol Cutter

Source: GAO analysis of Coast Guard information, Departments of Defense and Homeland Security policies, and GAO-09-322, GAO-20-195G, GAO-16-89G. | GAO-21-9

With Construction of First Two OPCs Already Underway, Design Remains Unstable and Late Testing May Pose Additional Risks

OPC Design Remains Unstable as Construction of First Two Cutters Continues

The Coast Guard began construction of the first two OPCs without achieving a stable design. This approach is contrary to best practices we identified in prior work for shipbuilding, which emphasize the importance of achieving a stable design before starting construction to reduce cost and schedule risk.²⁷

In major shipbuilding programs, developing a detail design typically encompasses the following three design phases:

- **Basic design.** Includes outlining the ship steel structure; routing all major distributive systems, including electricity, water, and other utilities; and ensuring the ship will meet the performance specifications.
- **Functional design.** Includes providing a further iteration of the basic design, such as information on the exact position of piping and other outfitting in each block—or basic building unit for a ship—and a 3D computer-aided design model is often generated.
- **Production design.** Includes generating work instructions that show detailed system information and also guidance for subcontractors and suppliers, installation drawings, schedules, material lists, and lists of prefabricated materials and parts.²⁸

According to best practices we identified for shipbuilding, design stability is achieved upon completion of the basic and functional ship designs.²⁹ At this point of design stability, the shipbuilder has a clear understanding of the ship structure as well as how every system is set up and routed

²⁷See GAO, *Best Practices: High Levels of Knowledge at Key Points Differentiate Commercial Shipbuilding from Navy Shipbuilding*, [GAO-09-322](#) (Washington D.C.: May 13, 2009).

²⁸[GAO-09-322](#).

²⁹[GAO-09-322](#).

throughout the ship. For the purposes of our review, we determined that the Coast Guard's definitions of preliminary, contract, functional, and transitional designs, along with their associated outputs, generally align with our definitions of basic and functional designs.³⁰

Additionally, according to shipbuilding best practices, any critical technologies—hardware and software technologies critical to the fulfillment of the key objectives of an acquisition program—must be matured and proven before a design can be considered stable. Specifically, best practices we identified for shipbuilding call for programs to require critical technologies to be matured into actual prototypes and successfully demonstrated in an operational or a realistic environment, commensurate with a Technology Readiness Level (TRL) of 7, before the award of the contract for lead ship design.³¹

The Coast Guard authorized construction on OPC 1 in September 2018 without completing the functional design and maturing its single critical technology. These challenges remained at the start of OPC 2 construction in March 2020. Specifically:

- **Design drawings contain outstanding concerns and are not fully certified.** Prior to start of OPC 1 construction, the program office conducted engineering reviews to determine the extent to which the OPC design was sufficiently detailed to start construction without re-work. During these reviews, program

³⁰The Coast Guard's definition of preliminary and contract designs—which include engineering descriptions of the ship and sub-systems and associated architectures, including arrangements, topside design, hull form, propulsion systems, and electrical systems—generally align with the definition of basic design in best practices we identified for shipbuilding. The Coast Guard's definition of functional design includes completing 2D design artifacts such as topside arrangement drawings, piping system calculations, and one-line diagrams. The Coast Guard's definition of transitional design includes completing a 3D model to capture the functional design and space arrangements populated with equipment, components, and systems, which is used to generate the production design. The Coast Guard's definition of functional and transitional designs generally align with the definition of functional design in shipbuilding best practices. The Coast Guard's definition of production design—which includes completing design artifacts necessary to build the ship such as piping and foundational details as informed by the 3D model—generally align with the definition of production design in shipbuilding best practices. See [GAO-09-322](#).

³¹[GAO-09-322](#). This is consistent with best practices we identified for evaluating technology readiness, which recommend that critical technologies reach TRL 7 at the decision point to start system development. See GAO, *Technology Readiness Assessment Guide: Best Practices for Evaluating the Readiness of Technology for Use in Acquisition Programs and Projects*, [GAO-20-48G](#) (Washington, D.C.: Jan. 7, 2020).

officials identified that moderate design risks remained, including compliance concerns with ESG's drawings and the maturity of the electrical distribution system. For example, a July 2018 engineering review conducted by the Coast Guard's Engineering and Logistics Directorate identified seven technical risks that pertained to the ship's structural design and distributive systems—including the electric plant, cableways, and auxiliary system—that increased the likelihood of construction re-work.

In addition, Coast Guard officials reported to us that the American Bureau of Shipping—an independent third-party assessor that ensures the ship is in compliance with the technical standards required in the contract—had certified 30 percent of the design drawings at the start of OPC 1 construction.³² The July 2018 engineering review identified this as a high risk, noting that if design submissions are not approved by the American Bureau of Shipping prior to construction, then any changes to design may lead to costly re-work, schedule delays, and compromises to the long-term performance and maintainability of the cutter.

In December 2019, before the start of OPC 2 construction, Coast Guard officials said the functional design was almost complete and that only minor issues remained, primarily with the heat, ventilating, and air conditioning system drawings. However, the Coast Guard's Engineering and Logistics Directorate's February 2020 engineering review identified the design maturity of these drawings as a high technical risk that hindered completion of the detail design. Similarly, this engineering review found that challenges with ESG's drawings remain a risk that posed likely schedule delays if the amount of construction drawing re-work experienced on OPC 1 continued into OPC 2 production. Additionally, the American Bureau of Shipping had approved 35 percent of the design drawings as of February 2020, one month before the start of OPC 2 construction. According to the engineering review, ESG did not submit drawings to the American

³²The maritime industry has certain requirements to ensure ships meet a minimum level of safety and quality. Classification societies, such as the American Bureau of Shipping, develop rules defining a minimum level of technical standards that are applied to ships. The American Bureau of Shipping previously assisted the Navy in developing the Naval Vessel Rules, which establish a minimum set of requirements for the design and construction of the Navy's surface combatant ships. The OPC program has adopted the Naval Vessel Rules with some modifications and requires the shipbuilder to obtain vessel classing from the American Bureau of Shipping in designing, building, and the OPC.

Bureau of Shipping until after Coast Guard accepted them, resulting in an atypical delayed delivery.

- **3D modeling of distributive system designs is incomplete.** At the start of OPC 1 construction, the program reported to us that the ship's 3D model was 78 percent complete but noted that it was sufficiently complete to support the first 6 months of construction. Prior to the start of OPC 2 construction, ESG conducted a physical review of the 3D model's progress and determined that the model was only 68 percent complete and not as advanced as the shipbuilder previously reported.³³ The February 2020 engineering review identified that the 3D modeling of the ship's distributive systems, including the auxiliary system and multi-cable transit systems designs, were incomplete, posing significant technical risks and potential production delays. In August 2020, Coast Guard officials stated that ESG's earlier design reports were likely inaccurate, but stated that the program is taking steps to ensure ESG matures the design to completion by reviewing metrics and meeting with shipbuilder representatives more regularly.

Additionally, since December 2019, ESG has assumed responsibility for completing more of the detail design, including reviewing and completing the remaining 3D model and production outputs, after ESG determined the subcontractor responsible for this effort was underperforming. According to the February 2020 engineering review, the need to address subcontractor performance has put additional burden on ESG's staffing, slowing planned design development on the remainder of the ship. Moreover, ESG and its subcontractor manage OPC's design in two separate databases that will not be merged until March 2021, just before OPC 3's planned construction start. In August 2020, Coast Guard officials told us that they anticipate finding discrepancies between the databases during the merge, which will need to be reconciled to ensure the model is stable enough to inform production outputs. These challenges increase the likelihood that needed design changes will be discovered late, resulting in production delays and rework on the first two OPCs.

- **Design of boat davit is immature.** At the start of OPC 1 construction, the boat davit—a crane used to launch and recover cutter boats from the side of the OPC—was assessed at a TRL of

³³As of December 2019, ESG estimated that OPC's design was approximately 75 percent complete compared to the 81 percent planned completion.

a 5 or 6 (approaching maturity) instead of a TRL 7 (mature), as called for in best practices we identified for shipbuilding.³⁴ This davit has been identified as a critical technology for the OPC. Further, the davit had not yet undergone a prototype demonstration, and the design contained multiple compliance issues that required resolution or an alternate davit to be selected. The program office noted that selection of an alternate davit would likely result in design re-work but determined that this risk did not affect first 6 months of construction.

At the start of OPC 2 construction, the Coast Guard's ship design team assessed the maturity of the davit design and noted it could be as low as a TRL 2, or equivalent to just a technology concept. If the boat davit design does not meet the required capability or reliability, then the OPC will not be able to satisfy select mission capability needs. In May 2020, OPC program officials told us that prototype testing for the davit is scheduled for December 2020, which will provide the Coast Guard with a better opportunity to determine the davit's actual TRL and whether or not the design will work as intended. Until then, construction is proceeding with placeholder data representing the davit system. However, any changes needed as a result of the davit changing size, weight, or power as it is matured increase the risk of design rework on OPCs 1 through 3, which will likely result in cost increases and schedule delays.

Additionally, lack of a reliable and proven davit can lead to safety and technical challenges. For example, in January 2016, we found that crews of the National Security Cutters raised concerns with the installed davit because it was unable to reliably lift the cutter boats in high seas. In response, the Coast Guard elected to replace the davits on the eight National Security Cutters, at an estimated cost of \$12.5 million.³⁵

Neither OPC's contract nor the Coast Guard's acquisition policy requires a demonstration of design maturity consistent with best practices we identified for shipbuilding. Specifically:

- The OPC contract requires 80 percent of design drawings to be approved with at least 6 months of production information to support the start of construction but does not specify a required level of completion for the

³⁴GAO-09-322 and GAO-20-48G.

³⁵GAO, *National Security Cutter: Enhanced Oversight Needed to Ensure Problems Discovered during Testing and Operations Are Addressed*, GAO-16-148 (Washington, D.C.: Jan. 12, 2016)

basic and functional designs. The contract also does not specify a required technology readiness level for the one critical technology—the davit—that must be demonstrated prior to starting construction.

- The Coast Guard’s acquisition policy does not require shipbuilding programs to demonstrate a level of design maturity consistent with shipbuilding best practices prior to commencing construction on the lead ship.³⁶ The policy does not specify the extent to which the basic and functional designs must be completed. Instead, the policy, which covers acquisitions beyond shipbuilding programs, requires that the design be 75 percent mature at the critical design review. Critical design review is an engineering milestone that is typically conducted prior to construction or production start to validate that the system design is sufficiently detailed to build without further change to the design.³⁷ Further, the policy does not specify a methodology for programs to use in determining design maturity, which hinders the program’s ability to determine the extent to which its design is consistent with shipbuilding best practices. Finally, the policy calls for technologies to be assessed during pre-construction engineering management reviews but does not specify a required level of maturity for critical technologies prior to starting construction consistent with shipbuilding best practices.³⁸

According to Coast Guard officials, detail design continues throughout the construction phase so that changes can be made, if necessary, while ships are on the production line. While we acknowledge that detail design is an iterative process, our previous work on shipbuilding best practices has found that production outcomes cannot be guaranteed until a stable design is demonstrated. Further, Coast Guard officials have emphasized that continued production of OPCs is critical to meet mission needs and that any construction delays with OPCs 2 through 4 could result in ESG’s

³⁶[GAO-09-322](#).

³⁷According to best practices we identified for knowledge-based acquisitions, non-shipbuilding programs should complete at least 90 percent of design drawings at critical design review to achieve design maturity. As noted earlier, shipbuilding best practices assess design maturity for shipbuilding programs at the start of lead ship construction rather than at critical design review, and use 3D model completion, as well as demonstration of critical technologies to determine maturity levels. See GAO, *Defense Acquisitions Annual Assessment: Drive to Deliver Capabilities Faster Increases Importance of Program Knowledge and Consistent Data for Oversight*, [GAO-20-439](#) (Washington, D.C.: June 3, 2020); [GAO-09-322](#); and *Best Practices: Capturing Design and Manufacturing Knowledge Early Improves Acquisition Outcomes*, [GAO-02-701](#) (Washington, D.C.: July 15, 2002).

³⁸[GAO-09-322](#). See also [GAO-20-48G](#).

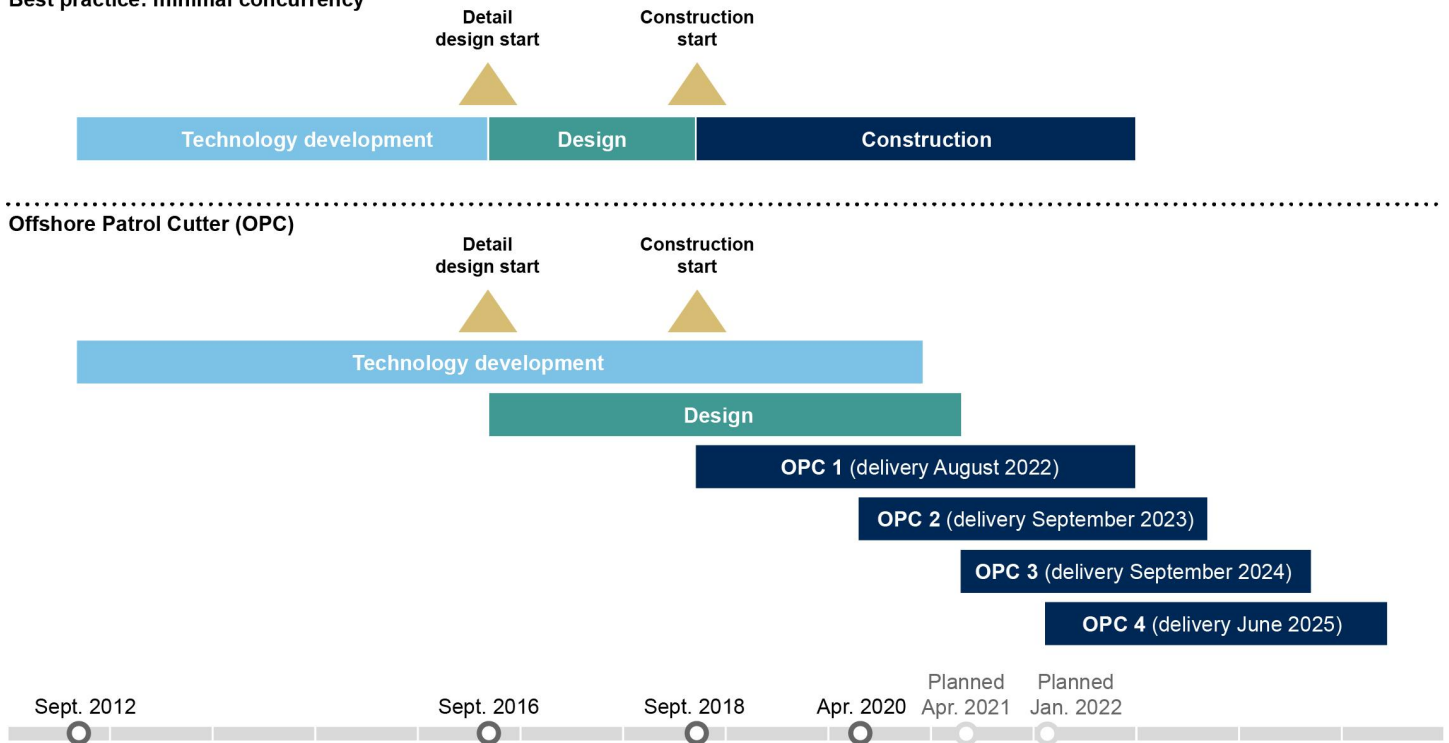
financial insolvency. As such, the program plans to award OPC 3 construction no later than April 2021 and OPC 4 by January 2022, as outlined in the program's schedule. However, prior to Coast Guard's consideration to exercise the contract option for construction for OPCs 3 and 4, ESG must satisfactorily complete a production readiness review to verify that the detail design supports construction for each hull as a condition of the extraordinarily contractual relief provided.³⁹

As shown in figure 8, the Coast Guard's decision to authorize the start of lead ship construction before achieving a stable design has led to overlap among the development, design, and construction phases.

³⁹In December 2019, the Coast Guard modified the OPC contract to add a production readiness review for OPCs 2 through 4 to determine ESG's readiness to start construction as a condition of the extraordinary contractual relief granted. Satisfactory completion of these readiness reviews is required prior to Coast Guard's consideration to exercise the option for construction for each subsequent ship.

Figure 8: Concurrency of OPC Technology Development, Detail Design, and Construction

Best practice: minimal concurrency



Source: GAO analysis of Coast Guard data. | GAO-21-9

We have previously found that this type of concurrency or overlap between technology development, design, and construction typically results in further cost growth and schedule delays—the opposite of its intended result.⁴⁰ Entering construction with unstable designs can disrupt the planned sequence of construction. For example, in June 2018, we found that nine Navy shipbuilding programs that we had previously reported on from 2007 through 2017 had overlapping technology development, design, or construction phases.⁴¹ Of these nine programs, six experienced cost growth of 20 percent or greater on lead ships. For example, the Navy’s San Antonio class amphibious transport dock ship (LPD 17) program started construction with slightly over half of the design completed. Without a stable design, we found that work was often

⁴⁰GAO, *Navy Shipbuilding: Past Performance Provides Valuable Lessons for Future Investments*, [GAO-18-238SP](#) (Washington, D.C.: June 6, 2018).

⁴¹[GAO-18-238SP](#).

delayed from early in the building cycle to later, during integration of the hull. As a result, the ship cost more than originally estimated and took much longer to construct.⁴²

Proceeding into OPC 3 production without maturing the design and addressing the outstanding design and technology challenges increases the likelihood that ESG will need to complete out-of-sequence construction and perform rework on OPCs 1, 2, and 3, which will result in increased costs and schedule delays. Similarly, if the Coast Guard's acquisition policy does not include required levels of completion for the basic and functional designs, and technology maturity consistent with best practices we identified for shipbuilding, future Coast Guard shipbuilding programs, including stage 2 of the OPC program, will likely face the typical schedule and cost risks associated with proceeding into construction without a mature design.

Late Operational Testing Increases Risk That OPCs Will Have Costly Design Changes or Not Meet Requirements

The OPC program will likely face additional design and operational risks in the future as a result of the program's current test strategy. As noted earlier, the Coast Guard does not plan to conduct initial operational testing of the OPC until September 2024 at the earliest, and potentially as late as September 2025.⁴³ This would be about 2 years after OPC 1's planned delivery and after OPCs 2 and 3 are planned to be delivered.

Initial operational testing is a key acquisition event designed to test all critical systems that are necessary for successful operations and ensure that the asset is capable of meeting its mission requirements. Delaying critical test events can lead to late discoveries that result in additional design changes and program costs. For example, in January 2016, we found that the National Security Cutter completed initial operational testing in 2014, after seven of the eight planned cutters were already under contract and three ships were operational.⁴⁴ Testing revealed major

⁴²[GAO-09-322](#).

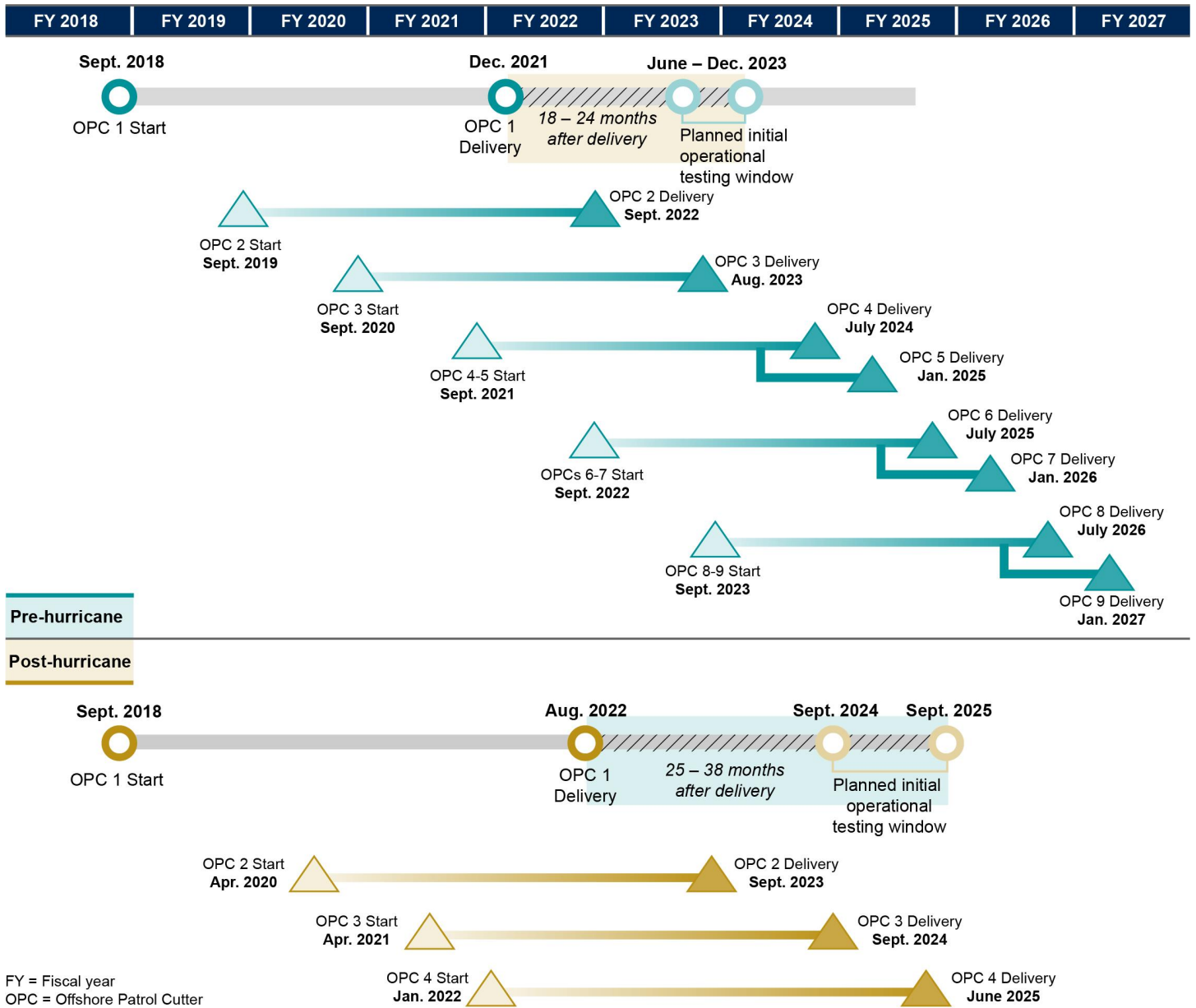
⁴³The OPC program's March 2020 acquisition program baseline established September 2024 as the objective or target date for initial operational testing and September 2025 as the threshold or latest acceptable date, to accommodate the government-owned installation of the combat weapons systems.

⁴⁴[GAO-16-148](#).

deficiencies and DHS instructed the program to address those deficiencies through follow-on test and evaluation.

To that end, the Coast Guard's acquisition policy notes that initial operational testing results should be used to inform a full-rate production decision—in other words, this testing should occur before a majority of the OPCs are authorized to begin construction. Before the hurricane and rebaselining, the OPC program had planned to start initial operational testing about 18 months after delivery of OPC 1, which would have informed the construction of OPCs 4 through 9, or about half of the OPCs planned to be constructed by ESG at that time. The program had previously reported on the risks related to conducting late initial operational testing, such as increased costs, but in May 2020, Coast Guard officials told us that they were no longer tracking this risk because the testing strategy was under the pre-hurricane acquisition strategy. Now, the testing targeted for September 2024, at the earliest, will occur at least 15 months later than originally planned and will not occur in time to inform the production decisions for any of the ESG-constructed OPCs (see figure 9).

Figure 9: Comparison of the OPC Program’s Planned Operational Testing and Construction Schedule Pre-and-Post Hurricane



Source: GAO analysis of Coast Guard information. | GAO-21-9

According to Coast Guard officials, operational testing cannot begin any earlier than September 2024 because OPC 1 will need to undergo a

variety of tests, trials, and construction in the post-delivery phase.⁴⁵ In the meantime, Coast Guard officials said the program plans to use engineering reviews and developmental testing to inform OPC's performance and minimize the risks of delayed or unsuccessful testing. The OPC program also plans to conduct an operational assessment in late fiscal year 2021 on the lead ship as it prepares for shipbuilder trials to identify any design risks to producing an OPC that meets requirements.⁴⁶ The results of operational assessments can help to identify programmatic voids, risk areas, and the adequacy of requirements, as well as whether the system is ready for operational testing. However, unlike operational testing, which is performed under realistic conditions, operational assessments do not inform the extent to which the system meets minimum operational requirements before the system is deployed because they test systems that are not production representative.

Prior to delivery, the lead ship will also undergo shipbuilder trials during which its performance will be evaluated against the contractually required specifications. While data resulting from shipbuilder trials can inform testing, these events are not a substitute for operational testing because they are largely conducted by the contractor instead of actual users and do not include an independent evaluation of how well the ship meets its operational requirements in its intended environment, as required by DHS's testing policy.⁴⁷

While OPC's testing schedule changed with the post-hurricane rebaseline, the OPC program did not revise its test and evaluation master plan. This plan is a documented test strategy for verifying program requirements that is traceable to the program's approved baseline, among others and is required by DHS policy. DHS's testing policy

⁴⁵During the post-delivery period, new construction ships undergo a series of events and inspections to ensure any deficiencies, upgrades, or incomplete construction work are addressed. See GAO, *Navy Shipbuilding: Policy Changes Needed to Improve the Post-Delivery Process and Ship Quality*, [GAO-17-418](#) (Washington, D.C.: July 13, 2017).

⁴⁶According to DHS's test and evaluation policy, operational assessments can be conducted at any time using prototypes, mock-ups, simulations, and other demonstrators. DHS programs may conduct operational assessments as they transition from developmental testing to operational testing. See also GAO, *Homeland Security Acquisitions: Opportunities Exist to Further Improve DHS's Oversight of Test and Evaluation Activities*, [GAO-20-20](#) (Washington, D.C.: Oct 24, 2019).

⁴⁷Department of Homeland Security (DHS) Directive 026-06, Test and Evaluation (May 5, 2017); DHS Instruction 026-06-001, Test and Evaluation (July 5, 2017).

requires programs to review and submit their test and evaluation master plans to DHS's Office of Test and Evaluation for approval at all applicable ADEs and whenever a cost, schedule, or performance breach occurs.⁴⁸ DHS's testing guidance also requires programs to identify any testing limitations that may significantly affect a testing evaluator's ability to draw conclusions about a system's maturity, capabilities, limitations, or readiness for operational use and address them in their test and evaluation master plans.⁴⁹ For example, the OPC program identified in its test and evaluation master plan that any delays to conducting initial operational testing would also delay the program in achieving an ADE 3 decision to authorize full-rate production, causing potential schedule delays.

DHS and Coast Guard officials told us that while the program's acquisition strategy changed post-hurricane, the program's stage 1 testing plans did not significantly change, so they did not believe it was necessary to update the test and evaluation master plan in support of ADE 2C and the authorization to start construction on OPC 2. Instead, Coast Guard officials said they plan to update the test and evaluation master plan to inform ADE 3 when testing impacts that could preclude the program from reaching full operational capability are better understood. However, the program does not plan to achieve ADE 3 until September 2027, at the earliest, which is over 2 years after the completion of stage 1 of the program and delivery of OPC 4.

Without revising its test and evaluation master plan for stage 1, the OPC program cannot identify the associated cost, schedule, and operational risks with its testing strategy, which may limit the Coast Guard's ability to determine the capabilities or limitations of the OPC for operational use. This approach also further increases the risk that any design challenges related to meeting mission requirements will not be discovered until after delivery of OPC 3, which could lead to additional costs to the program or the OPCs not fully meeting operational requirements.

⁴⁸Department of Homeland Security (DHS) Instruction 026-06-001, Test and Evaluation (July 5, 2017).

⁴⁹Department of Homeland Security (DHS) Instruction Guide 026-06-001-01, Test and Evaluation Master Plan (Feb. 6, 2017).

OPC Delivery Dates Based on Shipbuilder Schedule with Known Deficiencies and Do Not Fully Incorporate Risk

ESG's schedule limits the Coast Guard's ability to gauge progress and identify and address potential delays. The OPC detail design and construction contract requires ESG to develop and maintain a detailed schedule that includes the key milestones and all recurring events for each ship constructed. Prior to OPC 1 construction award and the hurricane, DCMA assisted the Coast Guard in reviewing ESG's schedule and found that the schedule contained a number of deficiencies. For example, ESG's schedule:

- could not produce a valid critical path—or the path of longest duration through the sequence of activities; and
- contained logic-related deficiencies between activities, which contributed to the schedule's inability to produce a valid critical path.

Based on these deficiencies, DCMA concluded that ESG's schedule could not be used to make program management decisions. These deficiencies are also inconsistent with selected best practices in GAO's Schedule Assessment Guide, which note that program schedules should have a valid critical path and sequence activities logically, among other practices.⁵⁰

Following Hurricane Michael, the DHS contract adjustment board found that ESG's scheduling practices remained insufficient, citing the following challenges with the schedule estimate ESG put forward for in its request for relief:

- ESG provided limited data and justification for the construction periods for OPCs 2 through 9.
- ESG did not use its workforce levels to develop estimates for when construction activities would be completed.
- There was a high risk of schedule delay beyond ESG's proposed post-hurricane schedule.

Coast Guard officials stated that ESG's inexperience with federal contracts and scheduling tools contributed to the challenges with ESG's schedule. For example, after the Coast Guard raised concerns about the accuracy of ESG's schedule data submissions in the post-hurricane

⁵⁰[GAO-16-89G](#).

analysis, the contract adjustment board reported that ESG officials said they would use successful commercial practices to build OPC, making the required schedule and data submissions redundant. The Coast Guard and DCMA officials told us ESG recently hired individuals with government shipbuilding experience to help address the scheduling concerns.

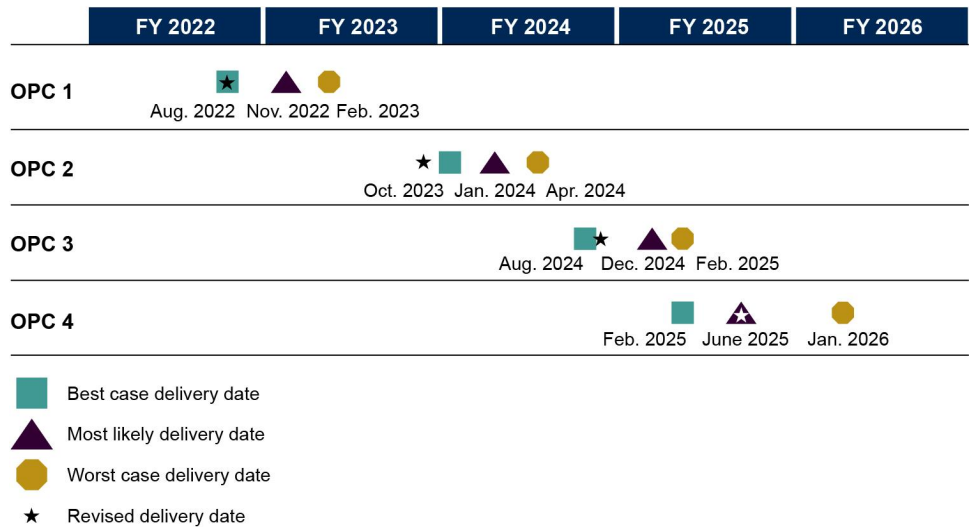
In April 2020, the Coast Guard, with DCMA's assistance, conducted a follow-on integrated baseline review to determine the extent to which OPC 1 was on track to meet its scheduled delivery. Coast Guard and DCMA officials told us that ESG has made some progress in addressing the previously identified schedule deficiencies, but Coast Guard officials said they found that ESG's schedule contained a high amount of schedule float (or slack). According to GAO's Schedule Assessment Guide, a schedule should identify reasonable total float.⁵¹ Unreasonably high total float on an activity or path indicates that the schedule may be missing activities or logic—in other words, certain activities appear as though they can be slipped when they actually cannot. As a result, the program's schedule may not accurately depict the program's flexibility, precluding management from making appropriate decisions in reallocating resources or resequencing work before the program may begin experiencing delays. Coast Guard and DCMA officials said that they anticipate that ESG will address this and any other remaining scheduling deficiencies by the fall of 2020. In the meantime, Coast Guard officials told us they review ESG's schedule analysis monthly and have seen improvement in ESG's ability to use this analysis to manage the schedule and mitigate risks.

Furthermore, OPC's post-hurricane delivery schedule is optimistic and does not fully account for risk. To determine the amount of schedule relief to provide to ESG, the Coast Guard used the DHS contract adjustment board's projections of the best case, most likely, and worst case delivery dates. The board estimated a 6- to 11-month difference between the best and worst case dates by varying assumptions about ESG's staffing projections and learning curves (efficiencies gained when workers apply learning to subsequent ships) after the first ship. In August and November 2019, the Coast Guard generally chose the more optimistic dates when

⁵¹Total float, the amount of time an activity can be delayed or extended before delay affects the program's finish date, can be positive, negative, or zero. If positive, it indicates the amount of time that an activity can be delayed without delaying the program's finish date. Negative total float indicates the time that must be recovered so as not to delay the program's finish date beyond the constrained date. See [GAO-16-89G](#).

setting the new OPC delivery dates in response to ESG's request for schedule relief (see figure 10).

Figure 10: OPC's Revised Delivery Dates for First Four Ships



FY = Fiscal year
 OPC = Offshore Patrol Cutter

Source: GAO analysis of Department of Homeland Security and Coast Guard information. | GAO-21-9

Further, OPC's post-hurricane delivery dates do not fully account for schedule risks, such as ESG's ability to retain and attract employees with the skill sets to support OPC production. Specifically:

- In determining the amount of schedule relief to provide ESG post-hurricane, the OPC program noted that it was unable to complete a full schedule analysis and risk assessment because of inconsistent schedule data from ESG.⁵² As a result, the program determined that the August 2022 contract delivery date for the lead ship may not be accurate and may need to be further delayed but ultimately granted a schedule delay consistent with ESG's request. Program officials also told us that they have not incorporated risks into the government schedule they maintain separately from ESG's detailed schedule to track OPC's key acquisition decision events against the milestones in the acquisition program baseline.

⁵²A schedule risk assessment is an analysis that uses statistical techniques to predict a level of confidence in meeting a program's completion date. A schedule risk analysis focuses on uncertainty and key risks and how they affect the schedule's activity durations. See [GAO-16-89G](#).

- ESG did not conduct a schedule risk assessment when developing its detailed schedule to determine the probability of delivering the lead ship by the contract delivery date until March 2020, after the program had already set the post-hurricane delivery dates. ESG's assessment identified that delivery of the lead ship could slip by 3 months to November 2022 if ESG's planned mitigation steps do not fully address the primary schedule risks they identified, which include potential delays in rebuilding production facilities and hiring more engineers to help finalize the OPC design. Coast Guard officials said they are continuing to monitor ESG's progress on OPC production on-site and confirmed that ESG is adopting mitigation strategies to maintain the delivery schedule. However, in July 2020, Coast Guard officials reported that there is a high probability that OPC 1 may be delivered up to 2 months late based on ESG's current data.

According to GAO's Schedule Assessment Guide, programs should include the results of the schedule risk analysis in developing an executable schedule.⁵³ Without fully incorporating risks into the schedule, the Coast Guard is unable to predict, with any degree of confidence, whether the estimated delivery dates are realistic.

Moreover, OPC's schedule metrics already indicate the program is behind schedule. At the time of the April 2020 integrated baseline review, ESG had completed about 20 percent of OPC 1 production. However, the completed work represented about 65 percent of the work planned to be completed at that time, indicating the program may be experiencing schedule delays.⁵⁴

Without ensuring that the OPC schedules are developed in accordance with GAO's Schedule Assessment Guide—including producing a valid critical path and fully incorporating risks into the schedules—the program does not have reasonable assurance that its delivery dates and schedule approved in March 2020 are realistic and achievable.

⁵³[GAO-16-89G](#).

⁵⁴As of April 2020, OPC's schedule performance index, which measures the ratio of work performed in terms of earned value relative to the initial planned schedule, was 0.65. An index less than 1 indicates that work is not being completed as planned and the program may be behind schedule. For more information on developing performance measure indexes to inform a program's progress see [GAO-20-195G](#).

OPC Cost Estimates Supporting Key Acquisition Decisions Lacked Critical Analyses to Fully Inform Program's Potential for Cost Growth

The Coast Guard, NAVSEA 05C, and DHS did not conduct critical analyses to fully inform the March 2020 cost estimate developed to support rebaselining the cost goals for stage 1 of the OPC program. Specifically, we found the March 2020 cost estimate for stage 1 developed by NAVSEA 05C on behalf of the OPC program:

- **Lacked a sensitivity analysis.** A sensitivity analysis involves recalculating the cost estimate by varying assumptions and parameters to determine how sensitive the cost estimate is to various factors. We found that while a sensitivity analysis was conducted for stage 2 of the program, NAVSEA 05C had not completed one for stage 1. GAO's Cost Estimating and Assessment Guide states that cost estimates should include a sensitivity analysis that identifies a range of possible costs, which helps ensure leadership is making informed decisions.⁵⁵
- **Lacked a risk and uncertainty analysis.** NAVSEA 05C did not conduct a traditional risk and uncertainty analysis, which according to GAO's Cost Estimating and Assessment Guide, should be conducted to quantify imperfectly understood risks.⁵⁶ NAVSEA 05C and program officials said they decided not to conduct a risk and uncertainty analysis as a time-saving measure given they had just 3 months to develop the estimate. Coast Guard officials explained that delaying the OPC 2 production decision to incorporate additional analyses would have increased the risk that ESG would become financially insolvent and thus unable to produce the OPCs. Instead, NAVSEA 05C and program officials said they used the results from the sensitivity analysis performed for the stage 2 acquisition instead of conducting a traditional risk and uncertainty analysis. However, as discussed above, the sensitivity analysis conducted did not include stage 1. Without performing a risk and uncertainty analysis, it is not possible for leadership to determine a level of confidence associated with the cost estimate, limiting insight into the

⁵⁵[GAO-20-195G](#). Our cost estimating guide includes 18 best practices for developing credible, accurate, well-documented, and comprehensive cost estimates. Our analysis did not assess the reliability of OPC's cost estimate against all 18 best practices. Instead, we identified instances in which the cost estimate did not align with selected best practices, which resulted in our analysis focusing on one best practice associated with the comprehensive characteristic and three best practices associated with the credibility characteristic.

⁵⁶[GAO-20-195G](#).

likelihood of the Coast Guard executing stage 1 of the program within the cost range reported in the program's March 2020 acquisition program baseline.

- **Was not informed by a current technical baseline document.** The technical baseline document—which describes the technical and operational characteristics of the program—was not updated to reflect the current status of the program, as required by DHS acquisition policy. Therefore, the Coast Guard has limited insight into cost changes resulting from program's revised acquisition program baselines.⁵⁷ For example, the estimate was based on the program's notional revised acquisition schedule rather than a detailed ESG or government schedule, neither of which had been approved when the cost estimate was conducted. GAO's Cost Estimating and Assessment Guide states that without an adequate understanding of the acquisition program, the cost estimator will not be able to identify the technical and program parameters that underpin the cost estimate and the quality of the cost estimate will be compromised.⁵⁸ While the program updated its technical baseline document in June 2020 these details did not inform the March 2020 cost estimate.
- **Was not independently assessed.** DHS's Cost Analysis Division did not conduct a traditional independent cost assessment to assess the credibility of the March 2020 cost estimate and identify the potential for cost growth.⁵⁹ Instead, they conducted a qualitative assessment to evaluate the March 2020 estimate in an effort to streamline the approval process to support timely acquisition decisions. The DHS Cost Analysis

⁵⁷According to DHS's acquisition policy, a technical baseline document is used to facilitate identification of any area or issue that could have significant effect on life cycle costs and therefore must be addressed in the cost estimate. The development of a technical baseline document is required for all major acquisitions to support the program life cycle cost estimate and any independent cost estimates that may be required. A program's technical baseline includes an understanding of the program's acquisition strategy, schedule (e.g., integrated master schedule), technical definition, characteristics, system design, and technologies included in the design. See [GAO-20-195G](#).

⁵⁸[GAO-20-195G](#).

⁵⁹Department of Homeland Security (DHS) Cost Estimating Handbook Development of a Life Cycle Cost Estimate (January 2016). According to DHS's Cost Estimating Guidance, an independent cost assessment is an analytical approach taken to assess the cost estimate based on but not limited to the following areas: (1) how well cost risk is identified and quantified, (2) the quality of underlying data sources, and, (3) appropriate use of cost estimating techniques. It focuses on the accuracy of program cost as it impacts risk, schedule and affordability and informs senior decision makers on the quality of the life cycle cost estimate and the potential for cost growth. DHS uses the cost estimating process and best practices found in GAO's Cost Estimating and Assessment Guide to ensure program estimates are credible, among other things.

Division determined that the March 2020 cost estimate was valid but noted that it was higher than the current contract target price and ESG would experience a loss on the lead ship, indicating there is a high likelihood that the Coast Guard will need to either modify the contract to add more of the authorized Public Law 85-804 funding or provide additional cash infusions to ESG before OPC 1 is completed. Additionally, DHS's Cost Analysis Division found that the March 2020 estimate did not include traditional cost risk calculations, as discussed earlier. As a result, DHS's Acting Chief Financial Officer recommended that the program include and track potential cost growth in its risk register, monitor program performance to inform annual updates to the cost estimate and mitigate cost risks, and implement traditional cost risk calculations in the next update.

The DHS Cost Analysis Division did not conduct an in-depth quantitative assessment on the March 2020 estimate because the methodologies used were the same as those used in the program's 2018 estimate, which had been independently assessed and determined to be credible. Additionally, DHS Cost Analysis Division officials said that they participated in assessing ESG's request for extraordinary contractual relief, which was used to inform the March 2020 cost estimate. As such, the officials said they were familiar with the program's cost models and methodology, confident in the Coast Guard's cost projections for stage 1, and did not believe a traditional independent assessment of the March 2020 estimate was necessary. However, unlike the March 2020 estimate, the contract adjustment board's cost analysis focused on developing a maximum amount of relief rather than the estimating the costs of designing and constructing the OPCs. Additionally, the March 2020 estimate was the first formal update to include the program's post-hurricane cost goals since the 2018 estimate. A traditional independent assessment of that estimate would have quantitatively—in addition to qualitatively—reviewed and documented the credibility of the Coast Guard's revised cost goals for completing design and construction on stage 1 of the program. According to GAO's Cost Estimating and Assessment Guide, lack of an independent assessment reduces the credibility of a cost estimate and increases the risk of the program proceeding underfunded because an independent assessment provides an objective review of whether the estimate can be achieved.⁶⁰

Coast Guard and NAVSEA 05C officials told us that DHS directed the program to develop the March 2020 estimate as an annual update, rather

⁶⁰[GAO-20-195G](#).

than a full program cost estimate, which removed DHS-required cost estimating steps, such as conducting a formal update to the technical baseline document and an independent review. DHS Cost Analysis Division officials told us they supported the program's approach of developing the March 2020 estimate in a short amount of time with streamlined documentation given their close involvement with the development of this estimate. However, according to DHS's acquisition policy, annual updates are streamlined and intended to just support annual budget requests, and programs should update and submit a full cost estimate for DHS approval for any rebaseline.⁶¹ As such, annual updates lack the robustness and credibility to support a program's cost rebaselining, which includes setting new threshold costs.

DHS and NAVSEA 05C officials confirmed that the April 2021 cost estimate for the entire program of record will incorporate a traditional risk assessment but not include an independent assessment, as this estimate will also be developed as an annual update. DHS officials told us that they do not plan to conduct an independent assessment until the development of a cost estimate supporting ADE 2B for stage 2 of the acquisition slated for fiscal year 2022. Coast Guard officials also told us the April 2021 estimate will largely focus on stage 2 using information learned from ongoing industry studies to inform the upcoming competitive award. As such, this new estimate will generally not focus on reassessing costs for stage 1 and the longer-term potential for cost growth for OPCs 1 through 4.

Basing the March 2020 cost estimate on a technical baseline that is not current undermines the credibility of the cost estimate. Additionally, lack of incorporating a sensitivity analysis, a risk and uncertainty analysis, and the results of an independent cost assessment may provide an inaccurate range of costs the program may incur for stage 1. As a result, the estimate may present an overly optimistic assessment of the program's potential cost growth should risks be realized or current assumptions change. This, in turn, may underestimate the true program costs for stage 1 and calls into question the revised March 2020 cost baseline that DHS approved and used to inform the OPC's budget request. As we found in July 2018, funding for the OPC construction is a top Coast Guard priority and is expected to consume a significant portion of the Coast Guard's

⁶¹Department of Homeland Security(DHS) Instruction 102-01-001, Rev 1.1, Acquisition Management Instruction (May 3, 2019).

planned acquisition budget over the next 10 years, raising uncertainties in how the Coast Guard will be able to fund other priorities.⁶² Having a cost estimate for OPC that may underestimate true program costs for stage 1 could have an adverse effect on the funding available for other Coast Guard programs if further cost increases are realized by this program prior the completion of OPC 4. Additionally, Congress is at risk of not having complete information of the program's longer-term potential for cost growth before committing to a course of action.

OPC Program Is Addressing Limits on Oversight Resulting from Shipbuilder's Deficient Business Systems

ESG's deficient business systems hindered Coast Guard's oversight of ESG and visibility into the OPC program's cost and schedule progress, but Coast Guard and ESG have ongoing efforts to address these challenges. Defense acquisition regulations require certain contractors who do business with the government to maintain acceptable contractor business systems to reduce risk to the government and taxpayer.⁶³ Moreover, OPC's detail design and construction contract specifically requires ESG to have acceptable business systems, including an earned value management system (EVMS) and accounting system.⁶⁴ Table 2 provides a description of these two systems, how they facilitate contract oversight, and the roles of DCMA and DCAA in evaluating these systems for the OPC contract.

⁶²[GAO-18-454](#).

⁶³DOD revised the Defense Federal Acquisition Regulation Supplement (DFARS) in 2012 to provide definitions for acceptable contractor business systems. DFARS § 252.242-7005. Applicable clauses may be included in contracts to generally require the contractor to maintain adequate business systems, allow for the government to withhold payments when systems are found to have significant deficiencies, and list the criteria that the systems must meet. The DFARS clause for accounting systems lists 18 criteria used to evaluate system features such as proper segregation of direct and indirect costs, while the DFARS clause for EVMS requires that a contractor's system comply with industry guidelines and includes procedures that generate timely, reliable, and verifiable reports. DFARS §§ 252.242-7006, 252.234-7002. See also GAO, *Contractor Business Systems: DOD Needs Better Information to Monitor and Assess Review Process*, [GAO-19-212](#) (Washington, D.C.: Feb. 7, 2019).

⁶⁴The OPC detail design and construction contract includes the DFARS clause § 252.234-7002 (EVMS) and DFARS clause § 252.242-7006 (Accounting System Administration). The contract is a fixed-price incentive (firm-target) contract type. In February 2019, we found that an incentive-type contract is a factor for including both EVMS and accounting system criteria in contracts. See [GAO-19-212](#).

Table 2: Earned Value Management and Accounting Business Systems and Role of Government Agencies in Offshore Patrol Cutter (OPC) Contract

Contractor business system	Description	How the system facilitates contract oversight	Role of DCMA and DCAA for OPC contract
Earned value management	A system for project management that effectively integrates the project scope of work with cost, schedule, and performance elements for optimum project planning and control.	Earned value management data is a key oversight tool that allows programs to monitor cost and schedule progress, understand the estimated resources needed to complete the program, and course correct as-needed to reduce the risk of cost overruns and schedule delays.	DCMA evaluated Eastern Shipbuilding Group’s (ESG) earned value management system (EVMS) against 32 EVMS guidelines in the Electronic Industries Alliance Standard from June to October 2018.
Accounting	A system for accounting methods, procedures, and controls established to record, analyze, and present accurate and timely financial data for reporting in compliance with applicable laws, regulations, and management decisions.	Accounting systems are used to determine costs applicable to the contract, which helps prevent contractors from overcharging or mischarging federal contracts.	DCAA evaluated ESG’s accounting system against the Defense Federal Acquisition Regulation System accounting system requirements for the calendar year 2018 period.

Source: GAO analysis of the Federal Acquisition Regulation, Defense Federal Acquisition Regulation Supplement, and Defense Contract Audit Agency (DCAA) and Defense Contract Management Agency (DCMA) information. | GAO-21-9

Prior to OPC 1 construction award and the hurricane, DCMA identified significant deficiencies with ESG’s EVMS, including:

- Deficiencies related to ESG’s schedule, which hampered the program’s ability to use the schedule for program management purposes and proactively address schedule risks, as discussed previously; and
- Deficiencies related to completing annual comprehensive estimates of costs at completion and the remaining costs to complete the program, which hindered the program’s ability to substantiate these costs and use the information for program management purposes.

DCMA officials stated that the deficiencies were attributable, in part to ESG’s and the Coast Guard’s inexperience with EVMS, including ESG’s lack of mature EVMS processes and appropriate tools to support a major acquisition program of OPC’s scope. DCMA officials added that while post-hurricane recovery efforts may have slowed efforts to address the deficiencies, the hurricane did not cause the deficiencies.

To address the EVMS deficiencies and mitigate the associated risks, the Coast Guard and ESG took the following steps:

- In March 2019, the Coast Guard issued a corrective action request to ESG to address the EVMS deficiencies. ESG developed corrective action

plans in June and July 2019 and hired additional staff with EVMS experience. In consultation with DCMA, the Coast Guard approved the corrective action plans in October 2019.

- According to Coast Guard officials, the program could not rely exclusively on EVM data to track the cost and schedule progress of the program and also relied on the project resident office—Coast Guard’s on-site office at ESG to manage day-to-day oversight of the contract—to assess the physical completion of OPC 1 to measure progress. Coast Guard and DCMA officials stated that as of April 2020, the EVM data were sufficient enough to provide a high-level status of the program. The program is also consulting with DCMA on a regular basis to interpret the EVM data.

In May 2020, OPC program and DCMA officials stated that ESG had made significant improvements in addressing the deficiencies and was on track to having a compliant EVMS by the fall of 2020.

Similarly, prior to DHS’s decision to grant extraordinary contractual relief, DCAA evaluated ESG’s accounting system and identified areas that may increase the risk of inaccurate billing to the government. DCAA finalized its findings on deficiencies with ESG’s accounting system in a November 2019 report.⁶⁵ DCAA officials noted that the deficiencies were generally not related to the hurricane or post-hurricane recovery efforts.

To address the accounting system deficiencies and mitigate the associated risks, the Coast Guard and ESG took the following steps:

- In December 2019, the Coast Guard modified ESG’s contract to link approval of construction start for the OPCs with ESG’s progress in addressing the accounting system deficiencies.
- In March 2020, the Coast Guard formally disapproved ESG’s accounting system based on DCAA’s findings. ESG responded the same month with its corrective action plans, which included implementing a new accounting system. DCAA, at the program’s request, reviewed ESG’s corrective action plans and concluded that effective implementation of the new system should help address most of the deficiencies identified.
- To mitigate the risk of inaccurate billings, in December 2019, the Coast Guard established a separate bank account to deposit government funds for payments to ESG, with Coast Guard supervision of transactions and withdrawals. Further, Coast Guard officials stated that the project

⁶⁵Specific information on ESG’s accounting system was omitted because the information was deemed sensitive by DOD.

resident office closely reviews and validates ESG's billing and invoices, and a third-party financial firm routinely analyzes ESG's financial transactions and position. In addition, DCAA officials stated that they established an audit team on-site at ESG in July 2020 and developed an audit plan for ESG's billings through September 2021.

As of March 2020, the program reported that ESG had made progress in implementing its seven corrective action plan tasks. ESG officials stated that they anticipate having a compliant accounting system by January 2021. DCAA officials stated that once the new system has been fully implemented for at least 6 months, they can audit the system to help inform Coast Guard's determination of system compliance and adequacy.

OPC Risks and Related Mitigation Strategies Are Not Regularly or Comprehensively Tracked but Program Initiated Steps to Improve Risk Management Approach

Risk management is critical to acquisition programs, especially the OPC program, which has been fraught with risks both pre- and post-hurricane, as discussed previously. To this end, the OPC program maintains a risk register—a central repository that tracks risks and related management actions.

According to DHS's acquisition policy and the Coast Guard's risk management guidance, an effective risk register includes a response plan and planned mitigation steps with measurable expected outcomes, including planned and actual completion dates, among other things.⁶⁶ The policy and guidance also state that the register should be updated and maintained regularly to ensure risks are tracked to closure.

We found that program officials do not regularly update the register to reflect the program's current status nor do they comprehensively record management actions to ensure risks are appropriately addressed as outlined in DHS and Coast Guard policy. Specifically, we identified the following limitations with the program's risk management approach:

⁶⁶Department of Homeland Security (DHS) Instruction 102-01-001, Rev 1.1, Acquisition Management Instruction (May 3, 2019); United States Coast Guard Commandant Instruction M5000.10F, Major Systems Acquisition Manual (September 16, 2019); United States Coast Guard Commandant Standard Operating Procedure No. 07, Program Risk Management and Mishap Risk Management (November 8, 2016).

- **Tracked risks are not regularly updated or current.** We found that the OPC program does not regularly update the risks it is tracking. For example, the risk register that OPC program officials provided to us in May 2020 had not been updated to include any information pertaining to the 11 new or revised design and technical risks identified by the Coast Guard's Engineering and Logistics Directorate's February 2020 engineering review to inform OPC 2 production. This review found that if the amount of construction drawing re-work experienced with OPC 1 continues, then construction delays for OPC 2 are highly likely if the risk is left unmitigated. Furthermore, the register does not contain any risks related to stage 2, such as industry's concern about using ESG's design to produce the remaining OPCs, as discussed previously.
- **Key risks are not being tracked.** We found that the program was not tracking several of the key design, cost, and schedule risks we identified and discussed earlier. Specifically, we found that the program's risk register as of May 2020 includes a number of design and technical risks, such as challenges with the heating, ventilation, and air conditioning and auxiliary systems drawings, and the boat davit's immaturity. However, the risk register does not track risks related to having an incomplete 3D design as the program proceeded with construction or that the 3D model is not expected to be completed until March 2021, just before the start of OPC 3 construction as discussed earlier. We also found that the program was tracking a risk related to conducting late operational testing according to its pre-hurricane baseline but the risk register has no risks related to the program's revised testing schedule post-hurricane, as previously discussed. Further, the program's register includes risks related to ESG's deficient EVMS, but does not include risks pertaining to deficiencies with ESG's accounting system or detailed schedule.
- **Risk management strategies are not comprehensively tracked.** The program did not include in its risk register triggering events that may exacerbate the risks, risk management strategies, or measurable expected outcomes and completion dates (planned or actual) associated with such strategies. This is particularly concerning because the OPC program elected to mitigate 46 of the 59 approved risks in its register but does not comprehensively document and track how it is planning to mitigate these risks, as outlined in DHS and Coast Guard policy. Additionally, a majority of these risks (31 of the 46) are identified as high or moderate risks, meaning there is a higher likelihood of them occurring or having a significant impact to the program should they occur.

Program officials stated that they are behind in updating their register to be current with recent program events, but we found that the OPC program is tracking selected programmatic risks through other means

identified in DHS and Coast Guard guidance. For example, the program convenes a risk management board on an as-needed basis to identify and review programmatic risks with stakeholders from across the component. Officials said the decision to convene the board is made by the OPC program manager, who reviews the register monthly and decides whether or not a risk management board meeting is necessary. However, the Coast Guard's risk guidance indicates that program risk plans and progress should be reviewed by the risk management board at least monthly to identify new uncertainties that may generate significant risk.

Additionally, officials said that mitigation strategies are developed for selected risks and presented in acquisition review board briefing slides for decision makers; however, officials confirmed that these strategies are not consistently tracked in one document, like the risk register. According to DHS guidance, risks documented in program artifacts—like the OPC's acquisition review board briefing materials—should be included in the risk register and managed in accordance with the chosen response plan.⁶⁷ Coast Guard officials told us in May 2020 that the OPC program is in the process of updating its risk register format to be more consistent with the Coast Guard's and DHS's recommended format, but they do not have an estimated time frame for completion. In August 2020, Coast Guard officials confirmed that the OPC program is working with DHS's Office of Program Accountability and Risk Management to improve its risk management processes.

According to DHS and Coast Guard guidance, successful risk management is dependent on the consistent early identification and mitigation of identified risks. Without regularly identifying, analyzing, and responding to risks systematically in its register, the OPC program cannot effectively manage and appropriately address its programmatic risks. Until the program has updated its risk register to follow the format and include content as indicated in the risk guidance, as well as holding regular risk management board meetings to identify new risks, the OPC program will likely continue to move the program forward through upcoming acquisition decisions—like awarding construction of OPC 3—and continue to commit significant resources without comprehensively

⁶⁷Department of Homeland Security (DHS) Office of Program Accountability and Risk Management, Risk Management Training Aide (October 9, 2018).

documenting and fully addressing risks, increasing the probability that the program will deviate from its cost, schedule, and performance goals.

Coast Guard Plans to Extend the Service Life of Selected MECs to Help Mitigate Risk of Widening Capability Gaps from OPC Delays

To address the potential operational capability gap resulting from the risk of the MECs failing before they are replaced by the OPCs, the Coast Guard started a \$1.86 billion acquisition program to extend the service life of six of the 270-foot MECs. The Coast Guard built flexibility into this MEC SLEP that allows it to include up to all 13 of the 270-foot MECs, as necessary, such as in response to the MECs failing faster than anticipated or if the OPC deliveries are further delayed. The Coast Guard decided not to extend the service life of the 210-foot MECs, which are slated to be replaced first by the OPCs. The MECs continue to face significant risks of failure due to age and obsolescence.

Coast Guard Initiated a SLEP of Selected MECs to Address Operational Capability Gap

To address the risks of the aging MECs failing before they can be replaced by the OPCs, the Coast Guard initiated a MEC SLEP that is intended to extend the service life of six of the 13 270-foot MECs. In July 2019, DHS approved ADE 2A/2B for this \$1.86 billion acquisition program, which allowed the program to enter the Obtain Phase of the DHS acquisition framework.⁶⁸ The SLEP is intended to add up to 10 years of service life for each of the six MECs undergoing service life extensions, which will help mitigate the gap before OPCs are delivered. As of August 2020, most of the MECs have exceeded their original 30-year service life, with the oldest 270-foot MEC commissioned in 1983. When the Coast Guard established the need for the OPC program in 2008, it noted that extending the service life of the entire MEC fleet was no longer economical and imposed increased risks to the ships' safety. Ten years later, DHS and the Coast Guard determined that due to the degraded reliability and obsolescence of the MECs and additional time needed for the OPCs to begin operational service, there was a need to establish the

⁶⁸The MEC SLEP is estimated to cost \$234.6 million in acquisition and \$1.62 billion in operations and support for a total lifecycle cost of \$1.86 billion.

MEC SLEP program, which entered the Analyze/Select phase in April 2018. Coast Guard officials stated that the 210-foot MECs—some of which have been in commission for over 55 years—are too old to be considered for service life extensions because of their condition and the extent of system obsolescence make it cost prohibitive.

The MEC SLEP includes the acquisition of two major systems: (1) the re-manufacturing of the main diesel engines—which are at the end of their service life—to help ensure reliability and (2) the upgrade of the electrical system, which includes replacing the ship-service and emergency generators. The SLEP will also include other upgrades, such as a structural refurbishment to the stern pipe and bearing, as well as updating selected weapons systems. The service life extension for each cutter is planned to take over 1 year to complete, and the MECs undergoing SLEP work will be unavailable for missions during this time.⁶⁹ The Coast Guard plans to conduct the SLEP at the Coast Guard Yard in Baltimore, Maryland, which according to the Coast Guard, will rely primarily on the government workforce and leverage experience from previous SLEPs for other Coast Guard assets.

To address the uncertainty of the OPC delivery schedule, the Coast Guard built flexibility into the SLEP contracts to extend the service life for up to all 13 of the 270-foot MECs, if necessary. According to Coast Guard officials, they will not need to make a decision to expand the MEC SLEP beyond six MECs until 2024, which would allow the program enough time to procure long-lead time materials. According to the Coast Guard, each additional MEC added to the SLEP program would cost approximately \$35 million per cutter in acquisition costs.

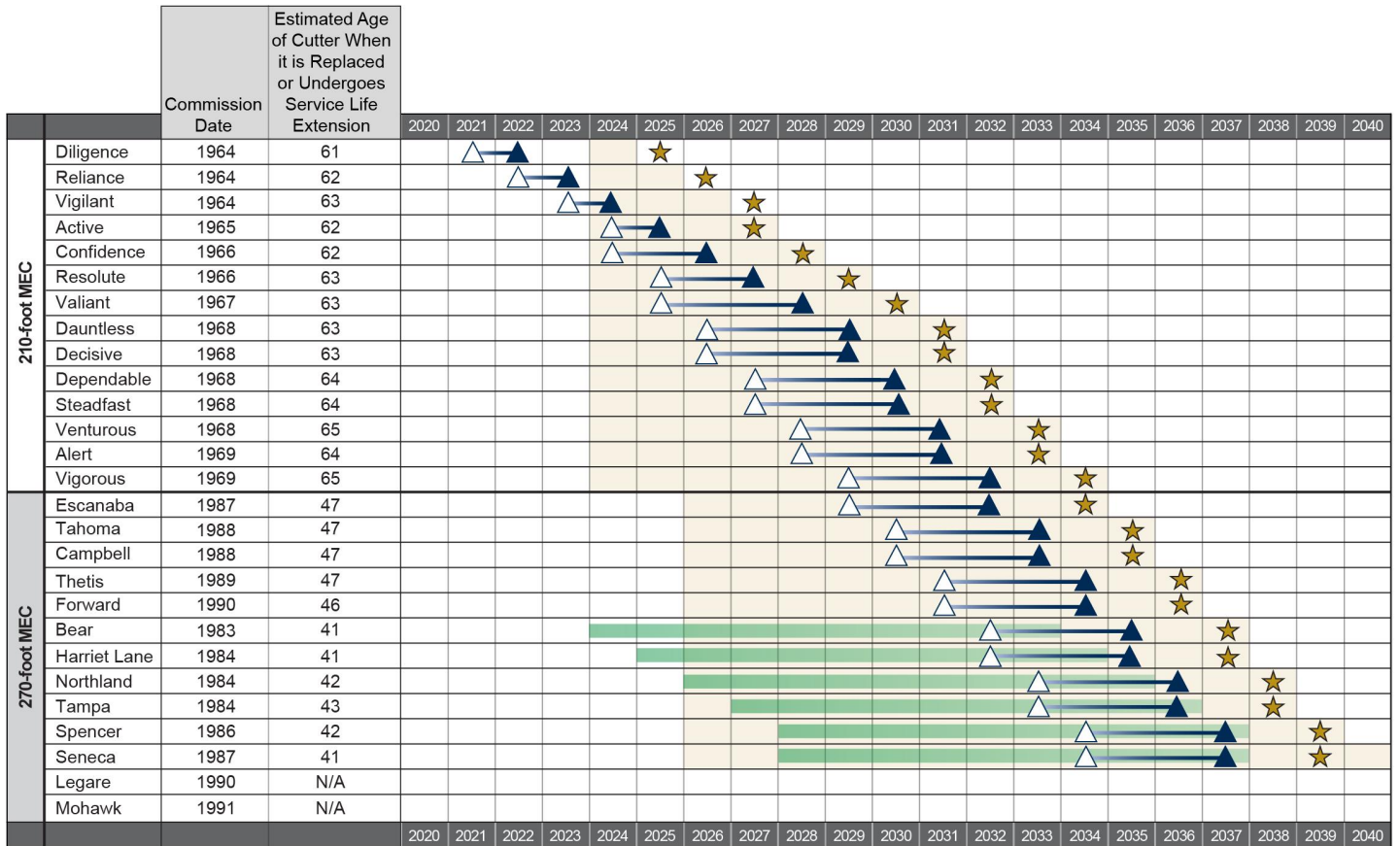
Post-Hurricane OPC Schedule and Degrading Condition of the MECs Exacerbate Risk of a Capability Gap

Even with the MEC SLEP, the Coast Guard continues to face risks of an operational capability gap as a result of OPC's post-hurricane delivery schedule and the degrading condition of the MEC fleet. Under the post-hurricane schedule, the OPCs are planned to be delivered anywhere from 8 months to 3 years later than originally planned before Hurricane Michael occurred. The Coast Guard plans to replace the 210-foot MECs

⁶⁹Two of the MECs selected to undergo a service life extension will also be out of commission for approximately 8 months in order for the Coast Guard to integrate prototypes of the upgraded electrical system.

with OPCs prior to replacing the 270-foot MECs, then replace the six 270-foot MECs that are selected for the service life extension after those that are not. The first 270-foot MEC is scheduled to undergo the SLEP starting in 2023 and will be available to the fleet again in 2024, while the service life extension of the sixth 270-MEC is scheduled to start in 2027 and be completed in 2028. Based on this plan, all 19 of the MECs that will be replaced by OPCs but not undergo a service life extension may still be in service from 1 to 10 years past their projected service lives and operate at reduced availability. Further, the six 270-foot MECs selected to undergo the service life extensions will not be replaced by the OPCs until 1 to 3 years past their extended service lives. Figure 11 presents the difference in the pre- and post- hurricane OPC delivery schedules as well as the risk of a capability gap between the projected end service life for the MECs and their OPC replacement.

Figure 11: U.S. Coast Guard's Estimated Medium Endurance Cutter (MEC) Service Life Dates and Offshore Patrol Cutter (OPC) Delivery and Operational Availability Schedule Before and After Hurricane Michael



- △ Notional schedule for estimated OPC deliveries pre-Hurricane Michael (2018)
- ▲ Notional schedule for estimated OPC deliveries post-Hurricane Michael (2020)
- ★ Notional schedule for estimated operational availability of OPCs after post-delivery activities (2020)
- Estimated operational availability of 270-foot MEC that undergo a 10-year service life extension
- Reduced asset availability due to end of projected service life

Source: GAO analysis of Coast Guard documents. | GAO-21-9

Notes:

This notional schedule presumes that the oldest MECs will be replaced in order of age from the oldest first, with the exception of the six oldest 270-foot MECs, which will be the first to undergo a service life extension. The Coast Guard has not yet determined the order in which the MECs will be replaced or which 270-foot cutters will be selected for the service life extension program.

The Coast Guard determinations of the projected service life of the MECs were supported with the most recent reports from the Ship Structure and Machinery Evaluation Board, which examined the assets' hull, mechanical, and electrical systems. The reports are also used to assess

when to start the planning process for major sustainment projects and what systems should be recapitalized as part of the project.

Further exacerbating the risk of an operational capability gap is the OPC program's schedule risks, as discussed earlier, which could push OPC delivery dates even further out and add additional strain to the MECs. The Coast Guard expects the risk of operational failures and maintenance costs for the MECs to significantly increase in the future. The Coast Guard's fiscal year 2019 sustainability assessments of the MECs, which assess and rank annually each cutter's ability to be affordably sustained, identified three 210-foot MECs and two 270-foot MECs as a high risk for sustainability, which reflects either a poor material condition or high maintenance costs. While the Coast Guard has initiated the service life extension for at least six of the 270-foot MECs, program officials stated that there is a high risk that the 270-foot MECs could experience system failures faster than they can be replaced or repaired. The Coast Guard strategies to mitigate this risk and the risk of further delayed OPC deliveries include adjusting the selection and order of MECs to undergo the SLEP and maintaining the option to extend the service life of up to all 13 of the 270-foot MECs if necessary, as discussed earlier.

Coast Guard Has Generally Met or Exceeded Mission Availability Goals for the MECs, but Expects Increased Risk of Operational Failures in the Future

Despite the age of the MECs and the high risk of system failure, the Coast Guard was generally able to maintain the MECs' mission capable rates—the percentage of time that the cutters are available for mission operations—at or above the target range from January 2018 through September 2019.⁷⁰ In 2018, we reported that the MECs' mission capable rate had been increasing from August 2014 to September 2017.⁷¹ The Coast Guard established the target mission capable rate for the MECs at 49 to 61 percent, meaning that the Coast Guard aims to ensure that the MECs are fully or partially capable of supporting missions within this range.⁷² Reasons for a MEC not being mission capable include planned

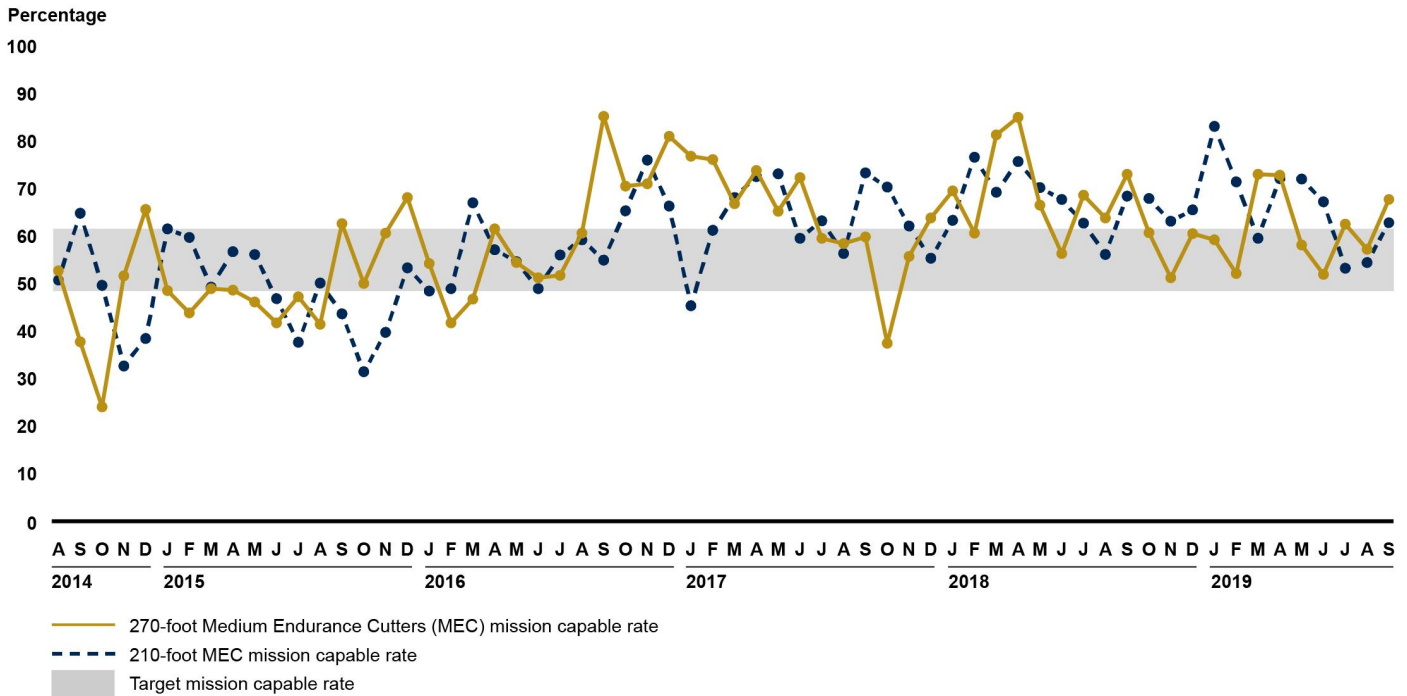
⁷⁰The Coast Guard first started using the mission capable rate for both the 210-foot and 270-foot MECs to track cutter mission availability in August 2014.

⁷¹[GAO-18-454](#).

⁷²The Coast Guard classifies a cutter as fully mission capable if it is able to perform all of its missions and partially mission capable if it is able to perform some but not all of its missions.

or unplanned maintenance or awaiting replacement parts. Figure 12 provides the monthly mission capable rates for both classes of MECs and how they compared to their target rates.

Figure 12: Actual and Target Mission Capable Rates for the MECs from August 2014 through September 2019



Source: GAO analysis of Coast Guard data. | GAO-21-9

The Coast Guard attributes its success at maintaining target mission capable rates to efforts such as implementing more specific maintenance plans based on the Coast Guard’s extensive historical knowledge of the cutters and improving supply-chain logistics for replacement parts. Coast Guard officials said that although future funding available for maintenance is uncertain, they have been able to target specific maintenance demands and defer other maintenance based on historical knowledge of the MECs’ condition and mission needs. However, they stated that they do not assess the effects of deferred maintenance on MEC mission capability rates. In July 2018, we found that the Coast Guard was operating the 270-foot MECs in 2017 above the maximum target mission capable rate, which could indicate that the MECs were not spending as much time as planned in maintenance. We determined that operating the MECs above the maximum target mission capable rate could increase risk because deferring maintenance could lead to declining ship conditions and longer

maintenance periods that can reduce a ship's operational availability.⁷³ Given the MECs' high mission capable rates in 2018 and 2019, deferred maintenance and potential reduced operational availability continue to be risks for the MECs moving forward.

While the MEC mission capable rates have been generally meeting the Coast Guard's goals, the Coast Guard acknowledged that the conditions of the MECs puts them at significant risk for operational failure, resulting in decreased capability for meeting mission requirements. In July 2018, we found that although the 210-foot and 270-foot MECs continued to perform missions, the Coast Guard was accepting a significant level of risk and the MECs could experience catastrophic failures.⁷⁴ More recently, the Coast Guard's 2019 OPC Alternatives Analysis—which assessed options to address the effects of the Hurricane Michael on the OPC program—noted that the 210-foot MECs obsolete propulsion systems presents an increasing risk of catastrophic failure.

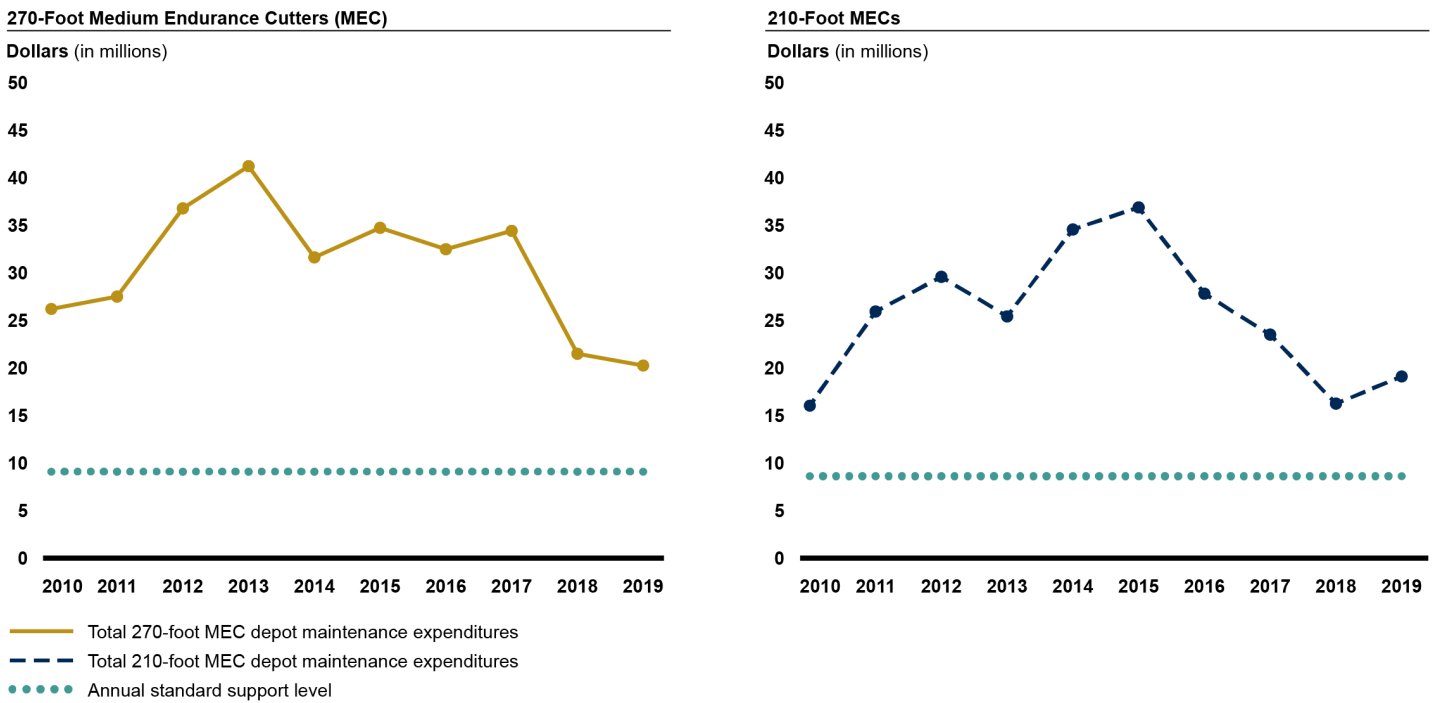
MEC Maintenance Costs Have Fluctuated but the Coast Guard Expects These Costs to Significantly Increase

As OPC deliveries are delayed, the Coast Guard has continued to spend millions of dollars on MEC depot maintenance, which can include regularly-scheduled service to maintain the cutter and unplanned emergency service that is beyond the capability of the cutter crew. From fiscal years 2010 through 2019, the Coast Guard's combined depot maintenance costs for the 210-foot and 270-foot MECs ranged from \$37.8 million to \$71.6 million annually. These costs have consistently exceeded the annual standard support levels, which are the budgeted amounts allocated by cutter class for depot-level maintenance each year (see figure 13).

⁷³GAO-18-454.

⁷⁴GAO-18-454.

Figure 13: Depot Maintenance Expenditures and Estimated Costs for the MECs from Fiscal Years 2010 through 2019



Source: GAO analysis of Coast Guard data. | GAO-21-9

Coast Guard officials noted that the recent decrease in depot maintenance costs can be attributed, in part, to mission effectiveness projects completed in 2010 and 2014, which were intended to minimize maintenance costs and maximize the reliability of critical systems. Other initiatives the Coast Guard cited to reduce maintenance costs included using contract strategies to combine maintenance efforts across assets, and using government employees instead of contracting for labor.

While the MECs’ depot maintenance costs have varied over the last 10 years, they have consistently exceeded each cutter’s annual standard support level. We found in March 2017 that the Coast Guard’s standard support levels—which are established early in an asset’s acquisition life cycle—are not updated on a regular basis to reflect actual expenditures.⁷⁵ For example, in fiscal year 2013 the actual depot maintenance costs for the 270-foot MECs were \$41.2 million, more than four times the standard support level of \$9.1 million. At that time, we recommended to the Coast

⁷⁵GAO, *Coast Guard Cutters: Depot Maintenance Is Affecting Operational Availability and Cost Estimates Should Reflect Actual Expenditures*, [GAO-17-218](#) (Washington, D.C.: Mar. 2, 2017).

Guard that standard support levels should be reviewed and updated periodically to more closely reflect actual expenditures. The Coast Guard concurred with our recommendation and noted in 2019 that it was in the process of implementing new guidance and procedures to use actual depot maintenance to inform standard support levels. However, the Coast Guard said that the standard support levels for the MECs remained the same in 2020 and did not have an estimated time frame for when the levels will start reflecting actual expenditures.

Despite the recent reduction in depot maintenance costs for the MECs, Coast Guard officials said that they expect these costs to increase as the MECs' systems become more obsolete, and that the cost of maintaining the MECs will become more unsustainable. In 2019, the Coast Guard conducted a trend analysis of MEC maintenance costs to develop estimates for the future costs of maintaining MECs past 2035, to support OPC post-hurricane planning. The Coast Guard estimated that even taking into account the MEC SLEP, annual maintenance costs for the 210-foot MECs could increase by approximately 80 percent from 2019 to 2035, while the annual cost for maintaining the 270-foot MECs will grow approximately 60 percent during the same period.⁷⁶ Additional delays to the OPC deliveries will also delay the decommissioning of the MECs and risk further increases in maintenance costs in order to maintain operational capability.

Conclusions

The OPC program is the single largest and highest priority program in the Coast Guard's acquisition portfolio. The OPC will be critical to the Coast Guard's offshore capabilities and ability to fulfill missions, including search and rescue and interdicting illegal drugs and migrants. Hurricane Michael devastated ESG's shipyard and disrupted the shipbuilding workforce, leading ESG to declare the costs and schedule in its contract untenable. These circumstances led DHS to grant extraordinary contractual relief to ESG for national defense reasons. The Coast Guard split the program into two stages and set new baselines but did not include delivery dates for each cutter. Omitting such key milestones limits decision makers' ability to provide oversight should the program experience additional schedule delays.

⁷⁶We did not independently verify the reliability of these estimates.

The Coast Guard's determination to deliver the OPC's in a timely manner—a task made even more difficult by the hurricane—has driven the program forward despite significant design, testing, schedule, and cost risks. OPC's incomplete design increases the risk of construction rework for the initial OPCs and will affect more OPCs if the program's level of design maturity continues to fall short of shipbuilding best practices. Similarly, future Coast Guard shipbuilding programs, including stage 2 of the OPC program, will likely face cost and schedule risks from rework if the Coast Guard does not update its acquisition policy to align with best practices on design maturity. Moreover, the OPC program will likely face design changes in the future if the program does not revisit its test strategy for stage 1 to identify any cost, schedule, or operational risks, given that this type of testing has revealed challenges with meeting mission requirements on another Coast Guard cutter program in the past.

Additionally, while the program and shipbuilder have improved their scheduling practices, unless the program ensures its schedules are dependable and fully incorporate risks, OPC's schedule will not reflect realistic dates for OPC delivery and, relatedly, when the MECs can be retired. Similarly, while the program and NAVSEA 05C developed a cost estimate to support cost baselines for stage 1 of the program, by not taking steps to ensure the estimate is credible, the program is at risk of costing more than what the Coast Guard has communicated to decision makers.

Finally, while the program is taking steps to improve its risk management approach, its current approach is not timely or comprehensive. Given the OPC program's track record in carrying risks forward, it is imperative that the program take a more robust risk management approach to help ensure these risks are properly documented and addressed.

Recommendations for Executive Action

We are making eight recommendations, four to DHS and four to the Coast Guard:

The DHS Secretary should ensure the DHS Under Secretary for Management directs the Coast Guard to revise OPC's acquisition program baseline for stage 1 to include OPC's delivery dates.
(Recommendation 1)

The DHS Secretary should ensure the DHS Under Secretary for Management directs the Coast Guard to include in OPC's acquisition program baseline for stage 2 OPC's delivery dates when the stage 2 acquisition program baseline is established and approved at ADE 2B. (Recommendation 2)

The Commandant of the Coast Guard should ensure the OPC program demonstrates that the OPC design for stage 1 is stable prior to approval of construction start for OPC 3 by (1) completing ESG's basic and functional designs and (2) maturing the davit technology to a TRL of 7, consistent with shipbuilding best practices. (Recommendation 3)

The Commandant of the Coast Guard should ensure the Coast Guard Component Acquisition Executive revises Coast Guard's acquisition policy to include criteria and a methodology for demonstrating design maturity for shipbuilding programs that are aligned with shipbuilding best practices, including specifying the completion of basic and functional designs and maturing critical technologies to a TRL of 7. (Recommendation 4)

The DHS Secretary should ensure the DHS Under Secretary for Management directs the Coast Guard, prior to approval of construction start for OPC 3, to identify the associated cost, schedule, and operational risks of the program's testing strategy for stage 1; and document these analyses in an updated test and evaluation master plan. (Recommendation 5)

The Commandant of the Coast Guard should ensure the OPC program updates its shipbuilder and government schedules for OPCs 1 through 4 to (1) fully address deficiencies identified in the shipbuilder's schedule, and (2) fully incorporate schedule risk analysis in accordance with schedule best practices. (Recommendation 6)

The DHS Secretary should ensure the DHS Under Secretary for Management directs the Coast Guard, as it develops the next life cycle cost estimate for the OPC program, to update its cost estimate for stage 1 in accordance with best practices for cost estimation, including: (1) conducting a sensitivity analysis, (2) conducting a risk and uncertainty analysis, (3) reflecting information from the program's most recent technical baseline, and (4) conducting an independent cost assessment of the estimate. (Recommendation 7)

The Commandant of the Coast Guard should ensure the OPC program improves its risk management processes to follow the format and include content as indicated in DHS acquisition policy and Coast Guard guidance, including (1) holding monthly risk management board meetings and updating its risk register regularly; (2) revising the risk register to include the risks we identified in this report—proceeding into construction with an incomplete 3D model, conducting late operational testing, challenges with ESG’s scheduling practices, and challenges with ESG’s accounting system; and (3) revising the risk register to comprehensively track risk management information. (Recommendation 8)

Agency Comments

We provided a draft of this product to DHS and DOD for comment. In its comments, reproduced in appendix II, DHS concurred with all eight of our recommendations and identified actions it planned to take to address them. DHS, the Coast Guard, and DOD also provided technical comments, which we incorporated as appropriate.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to the Secretary of Defense, the Acting Secretary of Homeland Security, the Commandant of the Coast Guard, and other interested parties. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-4841 or makm@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to the report are listed in appendix III.



Marie A. Mak
Director, Contracting and National Security Acquisitions

Appendix I: Objectives, Scope, and Methodology

This report examines (1) how the Coast Guard revised the Offshore Patrol Cutter (OPC) program after Hurricane Michael, (2) the extent to which the OPC program addressed major risks before proceeding through key acquisition decisions both pre- and post-hurricane, and (3) how the Coast Guard plans to mitigate the potential capability gap between end of service life for the Medium Endurance Cutters (MEC) and the delivery of the OPCs.

To determine how the Coast Guard revised the OPC program after Hurricane Michael, we reviewed revisions to Eastern Shipbuilding Group's (ESG) detail design and construction contract, including modifications made in accordance with the granting of extraordinary contractual relief; OPC's April 2012, September 2014, and March 2020 acquisition program baselines; Department of Homeland Security's (DHS) documentation of the analysis it conducted leading up to the memorandum authorizing extraordinary contractual relief; and documentation related to the recompetes of the requirement for OPCs 5 through 25, including the March 2020 industry study contract awards. We also determined the extent to which the OPC program's revised baselines include key milestones for oversight by reviewing the milestones included in the March 2020 acquisition program baseline, DHS acquisition policy, and acquisition program baselines for other major shipbuilding programs in the Coast Guard and the Navy. We also interviewed officials from OPC's program office, Coast Guard's contracting office, and representatives from ESG.

To assess the extent to which the OPC program addressed major risks before proceeding through key acquisition decisions both pre- and post-hurricane, we assessed five key areas:

- design maturity,
- cost estimates and risks,
- schedule estimates and risks,
- contractor business systems, and
- the program's risk management approach.

We determined the extent to which these five key areas were present at any of the following three key acquisition decisions DHS approved for the OPC program: (1) lead ship construction start in September 2018, which was pre-hurricane; (2) extraordinary contractual relief in October 2019, which was post-hurricane; and (3) OPC 2 construction start and rebaselining in March 2020. Specifically:

- To determine OPC's level of design maturity and design risks, we reviewed OPC's engineering review reports and the Coast Guard's design metrics. We determined OPC's requirements for design maturity by reviewing OPC's detail design and construction contract, engineering reviews, and Coast Guard acquisition policy.¹ We compared OPC's design maturity levels against best practices we identified in prior work for shipbuilding, including metrics for basic and functional design completion, and technology maturity.² We also reviewed the OPC program's testing plans and compared them to requirements in DHS's acquisition and test and evaluation policies to identify design and operational risks.³ We supplemented our analysis by interviewing officials from the OPC's program office, OPC's ship design team, and the Coast Guard's test and evaluation office.
- To determine OPC's schedule risks, we reviewed the program's schedule documentation including the program's integrated government schedule, ESG's integrated master schedule, schedule assessments conducted by the program and the Defense Contract Management Agency (DCMA), and the DHS contract adjustment board's schedule analysis. We compared these documents to GAO's Schedule Assessment Guide, which contains best practices for project schedules, and schedule

¹Coast Guard Commandant Instruction Manual 5000.10F, Major Systems Acquisition Manual (Sept. 16, 2019).

²GAO, *Best Practices: High Levels of Knowledge at Key Points Differentiate Commercial Shipbuilding from Navy Shipbuilding*, [GAO-09-322](#) (Washington, D.C.: May 13, 2009) and *Technology Readiness Assessment Guide: Best Practices for Evaluating the Readiness of Technology for Use in Acquisition Programs and Projects*, [GAO-20-48G](#) (Washington, D.C.: Jan. 7, 2020).

³Department of Homeland Security (DHS), DHS Instruction 102-01-001, Rev 1.1, Acquisition Management Instruction (May 3, 2019); DHS Directive 026-06, Test and Evaluation (May 5, 2017); and DHS Instruction 026-06-001, Test and Evaluation, (July 5, 2017).

requirements in DHS's acquisition policy, and identified instances in which the schedules did not align with those practices.⁴

- To determine OPC's cost risks, we compared OPC's March 2020 life cycle cost estimate to GAO's Cost Estimating and Assessment Guide, which contains best practices for developing and managing program costs, and identified instances in which the estimate did not align with selected practices.⁵ Our analysis did not assess the reliability of OPC's cost estimate against all best practices identified in GAO's Cost Estimating and Assessment Guide. We supplemented this analysis by interviewing representatives from the DHS contract adjustment board's cost team and the U.S. Navy's Naval Sea Systems Command's Cost Engineering and Industrial Analysis Group (NAVSEA 05C)—which performed the OPC life cycle cost estimate—and the DHS Cost Analysis Division—which is responsible for conducting independent cost assessments of program cost estimates.
- To examine the status of selected contractor business systems—ESG's earned value management system and accounting system—we reviewed business system evaluation reports developed by DCMA and the Defense Contract Audit Agency (DCAA), the OPC detail design and construction contract, and ESG's corrective action plans. We also interviewed officials from OPC's program office and contracting officials, DCMA, DCAA, and ESG.
- To assess OPC's risk management approach, we reviewed the program's risk register, risk management board minutes, and acquisition decision documents to identify how the program identified and managed risks and compared these efforts to risk management requirements in DHS's acquisition policy and the Coast Guard's risk management guidance.⁶ We also interviewed OPC's program office and contracting officials, DHS Program Accountability and Risk Management officials, and DHS contract adjustment board officials.

To determine how the Coast Guard plans to mitigate the potential capability gap between end of service life for the MECs and the delivery

⁴GAO, *GAO Schedule Assessment Guide: Best Practices for Project Schedules*, [GAO-16-89G](#) (Washington, D.C.: Dec. 22, 2015).

⁵GAO, *GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Program Costs*, [GAO-20-195G](#) (Washington, D.C.: Mar. 12, 2020).

⁶Department of Homeland Security (DHS), DHS Acquisition Management Directive 102-01, Rev. 03.1 (Feb. 25, 2019); DHS Acquisition Management Instruction 102-01-001, Rev. 01.1 (May 3, 2019); and Coast Guard Acquisition Directorate (CG-9), Standard Operating Procedure No. 7, Program Risk Management and Mishap Risk Management (Nov. 8, 2016).

of the OPCs, we reviewed MEC service life extension program (SLEP) acquisition documents, MEC engineering reports, OPC acquisition and contracting documents, and the DHS contract adjustment board report. We also analyzed the 210-foot and 270-foot MEC materiel availability data from Coast Guard's Electronic Asset Logbook database for August 2014 through September 2019 to determine mission capability rates. We reviewed data standards and guidance for the Electronic Asset Logbook database and interviewed Coast Guard officials to determine that the data were sufficiently reliable for the purposes of reporting the MEC mission capability rates from fiscal year 2014 through 2019. We also analyzed the Coast Guard's depot maintenance costs from fiscal year 2010 through 2019. We supplemented our analysis by interviewing officials from the MEC SLEP program office and Coast Guard's naval engineering office.

We conducted this performance audit from September 2019 to October 2020 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.

Appendix II: Comments from the Department of Homeland Security

U.S. Department of Homeland Security
Washington, DC 20528



**Homeland
Security**

October 14, 2020

Marie A. Mak
Director, Contracting and National Security Acquisitions
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Re: Management Response to Draft Report GAO-21-9, "COAST GUARD
ACQUISITIONS: Opportunities Exist to Reduce Risk for the Offshore Patrol
Cutter Program"

Dear Ms. Mak:

Thank you for the opportunity to comment on this draft report. The U.S. Department of Homeland Security (DHS) appreciates the U.S. Government Accountability Office's (GAO) work in planning and conducting its review and issuing this report.

The Department is pleased to note GAO's acknowledgment of the extraordinary circumstances and significant disruption caused by Hurricane Michael to Eastern Shipbuilding Group (ESG) and the Offshore Patrol Cutter (OPC) Program. In addition to the program and shipbuilder taking steps to improve their scheduling practices and risk management approach, DHS and the Coast Guard remain committed to maturing design, addressing schedule deficiencies, including risks, and updating the cost estimate in accordance with best practices to further strengthen production oversight of this essential national defense acquisition program.

The draft report contained eight recommendations with which the Department concurs. Attached find our detailed response to each recommendation. DHS previously submitted technical comments under a separate cover for GAO's consideration.

Again, thank you for the opportunity to review and comment on this draft report. Please feel free to contact me if you have any questions. We look forward to working with you again in the future.

Sincerely,

DAVID E
SCHMITT

Digitally signed by DAVID E
SCHMITT
Date: 2020.10.14 16:34:21
+0400

(for) JIM H. CRUMPACKER, CIA, CFE
Director
Departmental GAO-OIG Liaison Office

Attachment

**Attachment: Management Response to Recommendations
Contained in GAO-21-9**

GAO recommended that the DHS Secretary should ensure the DHS Under Secretary for Management direct the Coast Guard to:

Recommendation 1: Revise OPC's acquisition program baseline for stage 1 to include OPC's delivery dates.

Response: Concur. DHS leadership maintained the visibility of program progress through monthly Executive Steering Committee meetings. However, the DHS Management Directorate's Office of Program Accountability and Risk Management (PARM) agrees that additional interim milestones could be incorporated into the Acquisition Program Baseline (APB) to increase program transparency. To maintain consistency with DHS acquisition policy and precedent set by all other Coast Guard shipbuilding APBs (such as National Security Cutter, Fast Response Cutter, Polar Security Cutter, Response Boat – Medium, and 47' Motor Lifeboat SLEP), the Acting Under Secretary for Management, via PARM, will direct the Coast Guard to revise OPC's APB to include Stage 1 asset delivery dates for Hull #1 and Hull #4. Estimated Completion Date (ECD): May 31, 2021.

Recommendation 2: Include in OPC's acquisition program baseline for stage 2 OPC's delivery dates when the stage 2 acquisition program baseline is established and approved at ADE [acquisition decision event] 2B.

Response: Concur. DHS agrees that the Coast Guard should include additional interim milestones in the Stage 2 APB. To maintain consistency with DHS acquisition policy and precedent set by all other Coast Guard shipbuilding APBs (including National Security Cutter, Fast Response Cutter, Polar Security Cutter, Response Boat – Medium, and 47' Motor Lifeboat SLEP), the Under Secretary for Management, via PARM, will direct the Coast Guard to revise OPC's APB to include Stage 2 asset delivery dates for Hull #1 (OPC #5) and Hull #21 (OPC #25). This will be implemented at Stage 2 ADE 2B, which is planned to occur in the third quarter of fiscal year (FY) 2022. Further interim milestones are not yet identified. ECD: June 30, 2022.

GAO recommended that the Commandant of the Coast Guard:

Recommendation 3: Ensure the OPC program demonstrates that the OPC design for stage 1 is stable prior to approval of construction start for OPC 3 by (1) completing ESG's basic and functional designs and (2) maturing the davit technology to a technology readiness level of 7, consistent with shipbuilding best practices.

Response: Concur. The Coast Guard OPC Program will ensure the OPC design is stable and that basic and functional designs are sufficiently mature before OPC 3 construction. As of September 2020, the OPC basic design is complete, and the functional design is nearly complete. The Coast Guard anticipates that the small boat davit technology will be matured to at least a technology readiness level of 7 before awarding OPC #3, or will pursue a different davit. Eastern Shipbuilding Group (ESG) is currently on track to complete the functional design by March 2021. Additionally, Factory Acceptance Testing and American Bureau of Shipping testing of the davit will occur before January 2021 to verify that the davit is at a technology readiness level of 7. ECD: March 31, 2021.

Recommendation 4: Ensure the Coast Guard Component Acquisition Executive revises Coast Guard's acquisition policy to include criteria and a methodology for demonstrating design maturity for shipbuilding programs that are aligned with shipbuilding best practices, including specifying the completion of basic and functional designs and maturing critical technologies to a technology readiness level of 7.

Response: Concur. Consistent with the Department of Defense, the Coast Guard Acquisition Directorate will prepare appropriate guidelines outlining the design stability parameters to be reviewed before starting the construction of shipbuilding programs, such as maturity levels, to ensure the design is stable. These guidelines will also recognize that the relatively long construction span for ships requires flexibility in the design process to deal with factors such as obsolescence and ship construction and delivery schedule requirements and that functional design for naval vessels is rarely completed until after delivery and acceptance of the lead ship. Furthermore, design maturity risk must be balanced against other competing acquisition risks. The Coast Guard notes that new acquisitions such as the Polar Security Cutter and Waterways Commerce Cutter have increased design maturity requirements based on lessons learned from the Offshore Patrol Cutter program. ECD: December 31, 2021.

Recommendation 5: The DHS Secretary should ensure the DHS Under Secretary for Management directs the Coast Guard, prior to approval of construction start for OPC 3, to identify the associated cost, schedule, and operational risks of the program's testing strategy for stage 1; and document these analyses in an updated test and evaluation master plan.

Response: Concur. DHS agrees that the associated cost, schedule, and operational risks of the program's testing strategy should be identified and documented. The Test and Evaluation Master Plan (TEMP) is being updated by the OPC Program to align with changes in 2020 rebaseline and reflect the new multi-phase approach and schedule. Peer review is currently in progress; the updated TEMP is planned to enter Coast Guard Concurrent Clearance in November 2020, and is expected to be approved by the DHS

Science and Technology Director of Test and Evaluation before the award of OPC-3 construction in April 2021. ECD: April 30, 2021.

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Response: Concur. The Coast Guard's OPC Program continues to receive ESG's schedules, and is including those schedules with ongoing efforts to develop integrated government schedules in accordance with GAO's best practices. Over the past 12 months, and as evidenced by the last two Integrated Baseline Reviews (IBRs), ESG met USCG direction to provide a more robust and comprehensive analysis of their integrated master schedules. ESG provided a Schedule Risk Assessment (SRA) for OPC#1, which was reviewed by the government at the follow-up Integrated Baseline Review IBR for OPC#1 construction in April 2020. Additionally, ESG provided a detailed SRA for the recent IBR conducted in Sep 2020 for OPC#2 construction. In both cases, the SRA improved ESG's and USCG's ability to understand and mitigate risks in accordance with GAO scheduling best practices. ECD: October 29, 2021.

Recommendation 7: The DHS Secretary should ensure the DHS Under Secretary for Management directs the Coast Guard, as it develops the next lifecycle cost estimate for the OPC program, to update its cost estimate for stage 1 in accordance with best practices for cost estimation, including (1) conducting a sensitivity analysis, (2) conducting a risk and uncertainty analysis, (3) reflecting information from the program's most recent technical baseline, and (4) conducting an independent cost assessment of the estimate.

Response: Concur. The current lifecycle cost estimate was developed in the effort leading up to the Acting Secretary's decision to provide extraordinary relief to Eastern Shipbuilding Group for the continued production of OPCs, following Hurricane Michael's impacts as a Category 5 hurricane. The lifecycle cost estimate approach was explicitly tailored to the circumstances and designed to provide the Acting Secretary with sufficient information to make a well-informed decision. The DHS Office of the Chief Financial Officer, Cost Analysis Division, will work with the USCG to ensure that the next Life Cycle Cost Estimate (LCCE) submitted for DHS's Chief Financial Officer's approval follows best practices outlined by the GAO. The ECD will follow the program's schedule for Acquisition Decision Event 2B, planned for the fourth quarter or FY 2022. Prior to this, the USCG will submit updates to their LCCE in the form of annual estimates in April 2021 and April 2022 that will incorporate actuals from the prior year and address any changes to scope or schedule. ECD: September 30, 2022.

Recommendation 8: The Commandant of the Coast Guard should ensure the OPC

program improves its risk management processes to follow the format and include content as indicated in the DHS acquisition policy and Coast Guard guidance, including (1) holding monthly risk management board meetings and updating its risk register regularly, (2) revising the risk register to include the risks we identified in this report—proceeding into construction with an incomplete 3D model, conducting late operational testing, challenges with ESG’s scheduling practices, and challenges with ESG’s accounting system; and (3) revising the risk register to comprehensively track risk management information.

Response: Concur. Beginning in April 2020, the OPC Program made several improvements to its risk management processes, and will ensure the processes conform to all applicable DHS and Coast Guard policies. Recent improvements include designation of specific risk owners by name, an improved risk retirement and tracking process, more detailed risk descriptions, and increased oversight by program managers. Furthermore, the Coast Guard OPC Program worked with DHS PARM to update the OPC risk register in March 2020 to ensure that top risks are captured and actively tracked. The OPC Program updated the Risk and Opportunities Management Plan and expects that it will be approved before the end of October 2020. Furthermore, on September 15, 2020, the OPC program updated the program risk register to capture the specific risks identified by GAO. ECD: December 31, 2020.

Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

Marie A. Mak, (202) 512-4841 or makm@gao.gov

Staff Acknowledgments

In addition the contact named above, the following staff members made key contributions to this report: Rick Cederholm (Assistant Director), Alexandra Gebhard (Analyst-in-Charge), Peter Anderson, Brian Bothwell, Juaná Collymore, Jennifer Echard, Laurier Fish, Claire Li, Miranda Riemer, Matthew Shaffer, and Roxanna Sun.

Appendix IV: Accessible Data

Data Tables

Accessible Data for Figure 5: Delayed Delivery Dates for Coast Guard's OPCs 1 through 4 as a Result of October 2018 Hurricane

Category	Pre-hurricane delivery date	Post-hurricane delivery date	Slip
OPC 1	Dec 2021	Aug 2022	8 months
OPC 2	Sept 2022	Sept 2023	11 months
OPC 3	Aug 2023	Sept 2024	12 months
OPC 4	July 2024	June 2025	10 months

Accessible Data for Figure 10: OPC's Revised Delivery Dates for First Four Ships

Category	Best case delivery date	Most likely delivery date	Worst case delivery date	Revised delivery date
OPC 1	Aug 2022	Nov 2022	Feb 2023	
OPC 2	Oct 2023	Jan 2024	Apr 2025	
OPC 3	Aug 2024	Dec 2024	Feb 2025	
OPC 4	Feb 2025	June 2025	Jan 2026	June 2025

Accessible Data for Figure 12: Actual and Target Mission Capable Rates for the MECs from August 2014 through September 2019

Year	Month	270-foot Medium Endurance Cutters (MEC) mission capable rate	210-foot MEC mission capable rate
2014	A	52.8	50.8
2014	S	37.8	64.9
2014	O	24.1	49.7
2014	N	51.7	32.7
2014	D	65.7	38.5
2015	J	48.6	61.6
2015	F	43.9	59.8
2015	M	49	49.3
2015	A	48.7	56.8
2015	M	46.2	56.2
2015	J	41.8	46.9
2015	J	47.3	37.7
2015	A	41.5	50.2
2015	S	62.7	43.7
2015	O	50.1	31.5
2015	N	60.7	39.8
2015	D	68.2	53.4
2016	J	54.3	48.5
2016	F	41.8	49
2016	M	46.8	67.1
2016	A	61.6	57.2
2016	M	54.5	54.7
2016	J	51.3	49
2016	J	51.8	56.1
2016	A	60.7	59.3
2016	S	85.3	55
2016	O	70.6	65.4
2016	N	71.1	76.1
2016	D	81.1	66.4
2017	J	76.9	45.4
2017	F	76.2	61.3
2017	M	66.9	68.2
2017	A	73.9	72.6

Appendix IV: Accessible Data

Year	Month	270-foot Medium Endurance Cutters (MEC) mission capable rate	210-foot MEC mission capable rate
2017	M	65.3	73.2
2017	J	72.4	59.6
2017	J	59.6	63.3
2017	A	58.5	56.4
2017	S	59.9	73.4
2017	O	37.5	70.4
2017	N	55.8	62.2
2017	D	63.9	55.4
2018	J	69.6	63.4
2018	F	60.7	76.7
2018	M	81.4	69.3
2018	A	85.1	75.8
2018	M	66.6	70.3
2018	J	56.4	67.8
2018	J	68.7	62.8
2018	A	63.9	56.2
2018	S	73.1	68.5
2018	O	60.8	68
2018	N	51.3	63.2
2018	D	60.6	65.6
2019	J	59.3	83.2
2019	F	52.2	71.5
2019	M	73.1	59.6
2019	A	72.9	72.2
2019	M	58.2	72.1
2019	J	52	67.3
2019	J	62.6	53.3
2019	A	57.3	54.5
2019	S	67.8	62.9

Accessible Data for Figure 13: Depot Maintenance Expenditures and Estimated Costs for the MECs from Fiscal Years 2010 through 2019

na	270-Foot Medium Endurance Cutters (MEC)		210-Foot Medium Endurance Cutters (MEC)	
Fiscal Year	Dollars (in millions)	Average	Dollars (in millions)	Average
2010	26.203	9.087	16.034	8.62
2011	27.503	9.087	25.932	8.62
2012	36.779	9.087	29.58	8.62
2013	41.212	9.087	25.418	8.62
2014	31.627	9.087	34.56	8.62
2015	34.731	9.087	36.877	8.62
2016	32.484	9.087	27.808	8.62
2017	34.412	9.087	23.505	8.62
2018	21.491	9.087	16.25	8.62
2019	20.253	9.087	19.104	8.62

Agency Comment Letter

Accessible Text for Appendix II Comments from the Department of Homeland Security

Page 1

October 14, 2020

Marie A. Mak

Director, Contracting and National Security Acquisitions

U.S. Government Accountability Office

441 G Street, NW

Washington, DC 20548

Re: Management Response to Draft Report GAO-21-9, "COAST GUARD ACQUISITIONS: Opportunities Exist to Reduce Risk for the Offshore Patrol Cutter Program"

Dear Ms. Mak:

Thank you for the opportunity to comment on this draft report. The U.S. Department of Homeland Security (DHS) appreciates the U.S. Government Accountability Office's (GAO) work in planning and conducting its review and issuing this report.

The Department is pleased to note GAO's acknowledgment of the extraordinary circumstances and significant disruption caused by Hurricane Michael to Eastern Shipbuilding Group (ESG) and the Offshore Patrol Cutter (OPC) Program. In addition to the program and shipbuilder taking steps to improve their scheduling practices and risk management approach, DHS and the Coast Guard remain committed to maturing design, addressing schedule deficiencies, including risks, and updating the cost estimate in accordance with best practices to further strengthen production oversight of this essential national defense acquisition program.

The draft report contained eight recommendations with which the Department concurs. Attached find our detailed response to each recommendation. DHS previously submitted technical comments under a separate cover for GAO's consideration.

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Again, thank you for the opportunity to review and comment on this draft report. Please feel free to contact me if you have any questions. We look forward to working with you again in the future.

Sincerely,

DAVID E SCHMITT

(for) JIM H. CRUMPACKER, CIA, CFE

Director

Departmental GAO-OIG Liaison Office

Attachment

Page 3

GAO recommended that the DHS Secretary should ensure the DHS Under Secretary for Management direct the Coast Guard to:

Recommendation 1: Revise OPC's acquisition program baseline for stage 1 to include OPC's delivery dates.

Response: Concur. DHS leadership maintained the visibility of program progress through monthly Executive Steering Committee meetings. However, the DHS Management Directorate's Office of Program Accountability and Risk Management (PARM) agrees that additional interim milestones could be incorporated into the Acquisition Program Baseline (APB) to increase program transparency. To maintain consistency with DHS acquisition policy and precedent set by all other Coast Guard shipbuilding APBs (such as National Security Cutter, Fast Response Cutter, Polar Security Cutter, Response Boat – Medium, and 47' Motor Lifeboat SLEP), the Acting Under Secretary for Management, via PARM, will direct the Coast Guard to revise OPC's APB to include Stage 1 asset delivery dates for Hull #1 and Hull #4. Estimated Completion Date (ECD): May 31, 2021.

Recommendation 2: Include in OPC's acquisition program baseline for stage 2 OPC's delivery dates when the stage 2 acquisition program baseline is established and approved at ADE [acquisition decision event] 2B.

Response: Concur. DHS agrees that the Coast Guard should include additional interim milestones in the Stage 2 APB. To maintain consistency with DHS acquisition policy and precedent set by all other Coast Guard shipbuilding APBs (including National Security Cutter, Fast Response Cutter, Polar Security Cutter, Response Boat – Medium, and 47' Motor Lifeboat SLEP), the Under Secretary for Management, via PARM, will direct the Coast Guard to revise OPC's APB to include Stage 2 asset delivery dates for Hull #1 (OPC #5) and Hull #21 (OPC #25). This will be implemented at Stage 2 ADE 2B, which is planned to occur in the third quarter of fiscal year (FY) 2022. Further interim milestones are not yet identified. ECD: June 30, 2022.

GAO recommended that the Commandant of the Coast Guard:

Recommendation 3: Ensure the OPC program demonstrates that the OPC design for stage 1 is stable prior to approval of construction start for OPC 3 by (1) completing ESG's basic and functional designs and (2) maturing the davit technology to a technology readiness level of 7, consistent with shipbuilding best practices.

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Response: Concur. The Coast Guard OPC Program will ensure the OPC design is stable and that basic and functional designs are sufficiently mature before OPC 3 construction. As of September 2020, the OPC basic design is complete, and the functional design is nearly complete. The Coast Guard anticipates that the small boat davit technology will be matured to at least a technology readiness level of 7 before awarding OPC #3, or will pursue a different davit. Eastern Shipbuilding Group (ESG) is currently on track to complete the functional design by March 2021. Additionally, Factory Acceptance Testing and American Bureau of Shipping testing of the davit will occur before January 2021 to verify that the davit is at a technology readiness level of 7. ECD: March 31, 2021.

Recommendation 4: Ensure the Coast Guard Component Acquisition Executive revises Coast Guard's acquisition policy to include criteria and a methodology for demonstrating design maturity for shipbuilding programs that are aligned with shipbuilding best practices, including specifying the completion of basic and functional designs and maturing critical technologies to a technology readiness level of 7.

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Science and Technology Director of Test and Evaluation before the award of OPC-3 construction in April 2021. ECD: April 30, 2021.

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estimate for stage 1 in accordance with best practices for cost estimation, including (1) conducting a sensitivity analysis, (2) conducting a risk and uncertainty analysis, (3) reflecting information from the program's most recent technical baseline, and (4) conducting an independent cost assessment of the estimate.

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