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Audit Report



Implementation of Earned Value Management for the Virginia Class Submarine Program

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N2012-0031

5 April 2012

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MEMORANDUM FOR COMMANDER, NAVAL SEA SYSTEMS COMMAND
PROGRAM EXECUTIVE OFFICER SUBMARINES

Subj: **IMPLEMENTATION OF EARNED VALUE MANAGEMENT
FOR THE VIRGINIA CLASS SUBMARINE PROGRAM
(AUDIT REPORT N2012-XXX)**

Ref: (a) Naval Audit Service memo N2009-NAA000-0076, dated 29 Sep 09
(b) SECNAV Instruction 7510.7F, "Department of the Navy Internal Audit"

1. The report provides results of the subject audit announced in reference (a). Section A of this report provides our finding. The issues identified in this audit were addressed by recommendations made in our previous audit report, N2012-0011, "Implementation of Earned Value Management for the Future Aircraft Carrier Program," released on 22 December 2011. Therefore, this report does not contain recommendations.
2. Any requests for this report under the Freedom of Information Act must be approved by the Auditor General of the Navy as required by reference (b). This audit report is also subject to followup in accordance with reference (b).
3. We appreciate the cooperation and courtesies extended to our auditors.



XXXXXXXXXXXXXXXX
Assistant Auditor General
Research, Development, Acquisitions, and
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Subj: **IMPLEMENTATION OF EARNED VALUE MANAGEMENT
FOR THE VIRGINIA CLASS SUBMARINE PROGRAM
(AUDIT REPORT N2012-0031)**

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Executive Summary

Overview

Earned Value Management (EVM) is one of the primary methods that contractors and Government program managers use to measure a contractor's cost, schedule, and technical progress on contracts for significant acquisition programs. Contractors managing such programs for the Department of Defense (DoD) are required to use an integrated Earned Value Management System (EVMS) that meets best business practices and the 32 EVMS guidelines included in the American National Standards Institute/Electronic Industries Alliance Standard 748. The guidelines provide contractors with the framework to develop and implement effective management control systems tailored to meet their respective needs, while still ensuring that fundamental EVM concepts are applied.

In 2002, the Naval Audit Service began a series of EVM audits — initially at the request of the Deputy Assistant Secretary of the Navy (Research, Development, and Acquisition) for Management and Budget (formerly Planning, Programming, and Resources) — because there were concerns about how Government program managers were implementing and using EVM to manage their programs. Throughout our EVM audit series, we have evaluated the key players and their roles within the EVM process: the Government program managers' use of EVM to manage and make decisions on their programs; the contractors' application of EVM on the Defense program; the compliance of the contractors' EVMS with EVMS guidelines; and the oversight and surveillance provided by the contract management offices and the contract auditors. As a result of our EVM audit series, we found that EVM, a primary DoD internal management control process for managing cost, schedule, and performance of acquisition programs, had not functioned as intended.

Since the first report of the series was published in 2003, we have identified systemic weaknesses associated with the implementation and oversight of EVM within the Department of the Navy (DON). In response to the systemic weaknesses within EVM implementation found during our audits, both DoD and DON have made some noteworthy improvements through : (1) issuance of policy memoranda indicating their commitment to embrace EVM as the best tool available to the program management community and to senior leaders for effectively managing large, complex acquisitions; and (2) establishment of EVM Centers of Excellence at the Senior Acquisition Executive level for each military department to ensure proper execution of their EVM operational responsibilities. However, despite these actions, the implementation and use of EVM to

manage Navy acquisition programs continues to be an internal control weakness within DON, particularly within shipbuilding programs. This is evidenced by the two programs reviewed for this EVM audit: the Future Aircraft Carrier and the Virginia Class Submarine programs. Also, DoD and DON recognize that there is still a need to improve their EVM implementation, oversight, and governance to ensure consistency throughout the Department of the Navy and the Department of Defense. As a result, the EVM system weaknesses identified during this audit (for which field work ended in October 2010) have been acknowledged by the Virginia Class Submarine Program Office, both Supervisors of Shipbuilding, and the contractors. Since completion of the audit field work, each party has made efforts to mitigate or resolve the identified EVM system deficiencies. See “Actions Taken by Management” for more details.

Reason for Audit

The audit objective was to verify that EVM was implemented in accordance with DoD requirements and used to monitor acquisition program costs, schedules, and performance for the Future Aircraft Carrier and the Virginia Class Submarine programs.

This audit report addresses the implementation and use of EVM for the Virginia Class Submarine program at Huntington Ingalls Incorporated-Newport News Shipbuilding (formerly known as Northrop Grumman Shipbuilding Inc.) in Newport News, VA¹ and General Dynamics Electric Boat in Groton, CT. The Virginia Class Submarine program is a DON Acquisition Category ID program.² The program is managed by the Virginia Class Submarine Program Management Office (PMS-450) and reports to the Program Executive Officer for Submarines. The results of the audit of the Future Aircraft Carrier are contained in our prior report, N2012-0011, “Implementation of Earned Value Management for the Future Aircraft Carrier Program,” released on 22 December 2011.

As noted above, the Naval Audit Service initially undertook EVM audits at the request of the Deputy Assistant Secretary of the Navy (Research, Development, and Acquisition) for Management and Budget (formerly Planning, Programming, and Resources). EVM has been an area of concern for senior DON management due to the inconsistent and ineffective implementation on major acquisition programs impacting DON’s ability to perform its mission.

¹ On 30 March 2011, the Northrop Grumman Corporation completed its spin-off of its shipbuilding business to its shareholders. The separation of the division — now known as Huntington Ingalls Incorporated — is intended to provide a more focused effort on shipbuilding by the new company, and allow Northrop to focus on its other business units. Therefore, Northrop Grumman Shipbuilding will be referred to as Huntington Ingalls Inc.-Newport News Shipbuilding (HIINC-NNS) throughout this report.

² Acquisition Category I programs are Major Defense Acquisition Programs. A Major Defense Acquisition Program is a program estimated by the Under Secretary of Defense (Acquisition, Technology, and Logistics) to require 1) eventual expenditure for Research, Development, Test, and Evaluation of more than \$365 million (Fiscal Year 2000 constant dollars), 2) procurement of more than \$2.19 billion (Fiscal Year 2000 constant dollars), or 3) designation by the Under Secretary of Defense (Acquisition, Technology, and Logistics) to be Major Defense Acquisition Programs. Acquisition Category I programs may also be those designated by the Under Secretary of Defense (Acquisition, Technology, and Logistics) as special interest programs. The Under Secretary of Defense (Acquisition, Technology, and Logistics) is the Milestone Decision Authority (MDA) for ACAT ID programs. The “D” refers to the Defense Acquisition Board (DAB), which advises the Under Secretary at major decision points.

Noteworthy Accomplishments

In our previous EVM report (N2012-0011) addressing EVM use and implementation for the Future Aircraft Carrier program (CVN 78), we noted the positive steps taken by the DON Center for Earned Value Management, Naval Sea Systems Command (NAVSEA) Cost Engineering and Industrial Analysis Division (NAVSEA 05C), and Supervisor of Shipbuilding Headquarters (NAVSEA 04Z) to address the EVM material weaknesses within shipbuilding programs. This working group, which formed in 2010, is currently taking action to address EVM oversight and application issues across shipbuilding programs. In 2011, the working group assessed: training, policy, Supervisor of Shipbuilding EVM structure, staffing levels and capability, and EVM oversight processes. These positive actions should improve the implementation and oversight of EVM within shipbuilding programs and address the Supervisor of Shipbuilding internal control weaknesses identified in this report.

As a result of the above mentioned working group, the Defense Contract Management Agency and DON issued amplifying EVM guidance for shipbuilding programs on 19 December 2011. In this new guidance, DON affirms that EVMS guidelines apply to shipbuilding programs, but application of these guidelines is different than in most other industries. Specifically, a team of EVM experts met with shipbuilding stakeholders and leadership to establish a common methodology for assessing compliance with five EVM guidelines that have been most susceptible to differing interpretations. This memorandum (which was issued after our evaluation) documents the agreement between the Defense Contract Management Agency and DON on guidelines 1, 6, 10, 11, and 21, and defines the basis for evaluating these five areas for EVM compliance.

Conclusions

We found that EVM was not fully implemented and used to monitor acquisition program cost, schedule, and performance for the Virginia Class Submarine contracts at Huntington Ingalls Incorporated-Newport News and General Dynamics Electric Boat in accordance with DoD requirements. Our audit of transactions occurring between February 2009 and October 2010 identified the following risks associated with the implementation and use of EVM on the Virginia Class Submarine program:

- The contractors' EVMS did not fully comply with all of the 32 DoD-established EVMS guidelines; and
- Supervisor of Shipbuilding Newport News and Supervisor of Shipbuilding Groton did not provide formal surveillance over their respective contractors' EVM implementation.

These conditions occurred because:

- The contractors did not place sufficient emphasis on implementation of EVM for the Virginia Class Submarine program in accordance with DoD requirements;
- Supervisor of Shipbuilding Newport News and Supervisor of Shipbuilding Groton did not implement a surveillance program;
- Supervisor of Shipbuilding Newport News and Supervisor of Shipbuilding Groton did not have sufficient personnel with adequate EVMS surveillance training and experience to monitor the contractors' EVMS compliance with DoD policy; and
- The Center for Earned Value Management for DON and Naval Sea Systems Command did not provide sufficient EVM support to ensure that it was properly implemented for Navy shipbuilding contracts.

Communication with Management

We briefed both the military and civilian principal deputies to the Assistant Secretary of the Navy, Research, Development, and Acquisition to inform them of the EVM audit history and the current EVM audit program selection. We also discussed our preliminary conclusions with the Under Secretary of the Navy on 19 March 2010; with the Assistant Secretary of the Navy, Research, Development, and Acquisition on 24 April 2010; with Virginia Class Submarine Program Management Office on 28 October 2010; and with the Deputy Assistant Secretary of the Navy (Research, Development, and Acquisition) for Management and Budget on 21 April 2011. We conducted these meetings to keep them informed of our audit progress, facilitate discussion, and foster prompt corrective actions where appropriate.

Federal Managers' Financial Integrity Act

The Federal Managers' Financial Integrity Act of 1982, as codified in Title 31, United States Code, requires each Federal agency head to annually certify the effectiveness of the agency's internal and accounting system controls. In our opinion, the weaknesses noted in this report may warrant reporting in the Auditor General's annual Federal Managers' Financial Integrity Act memorandum identifying management control weaknesses to the Secretary of the Navy.

Corrective Actions

We did not make recommendations in this report because the actions being taken by the Department of Navy Center of EVM and Naval Sea Systems Command in response to previous Naval Audit EVM reports and other agency reviews should address the internal control weaknesses identified in this audit report.

Section A:

Finding and Recommendations

Finding 1: Implementation and Oversight of Earned Value Management for the Virginia Class Submarine Program

Synopsis

Neither the contractors³ on the Virginia Class Submarine (VCS) Program, nor the Supervisors of Shipbuilding at Newport News and Groton implemented Earned Value Management (EVM) on VCS in accordance with Department of Defense (DoD) requirements. Specifically:

- Both contractors' EVM systems (EVMSs), as related to the VCS acquisition program, did not fully demonstrate compliance with all of the 32 EVMS guidelines established in DoD acquisition policy (see Exhibits D and E for details); and
- The Supervisor of Shipbuilding Newport News and Supervisor of Shipbuilding Groton surveillance activities did not ensure continuous compliance with the 32 EVMS guidelines for the VCS program.

These conditions occurred because: the contractors did not place sufficient emphasis on the implementation of EVM in accordance with DoD requirements for the VCS program; neither of the Supervisors of Shipbuilding at Newport News and Groton implemented a surveillance program; monitoring personnel at both activities did not have the training and experience necessary to conduct EVMS surveillance activities; and Naval Sea Systems Command and the DON Center for Earned Value Management did not provide sufficient EVM support for the VCS program. As a result, the Earned Value data used for managing and making informed decisions about the contractors' costs, schedules, and technical performance may be unreliable.

Discussion of Details

Background

The Virginia Class Submarine (VCS) is a nuclear-powered attack submarine with multi-mission capability and enhanced capabilities for performance in littoral areas.

³ Huntington Ingalls Inc.-Newport News Shipbuilding and General Dynamics Electric Boat.

Intended to replace the fleet of SSN 688 Class submarines, the VCS is characterized by state-of-the-art stealth, enhanced features for special operations forces, and cost-effective command, control, communication and intelligence capability. According to the VCS program description, with an array of armament, including the MK48 Advanced Capability torpedo and cruise missile vertical launch capability, the VCS maintains total undersea superiority at an affordable cost.

In September 1998, General Dynamics Electric Boat in Groton, CT signed a \$4.2 billion contract to build four Virginia Class Submarines (Block I). In August 2003, General Dynamics Electric Boat was awarded an \$8.4 billion follow-on contract to build six additional Virginia Class Submarines with options for two additional submarines and spares (Block II). This was later modified in 2004 to be a multi-year contract. The VCS Block III contract was awarded to the General Dynamics Electric Boat to build eight submarines for \$13.9 billion on 22 December 2008. General Dynamics Electric Boat worked with Huntington Ingalls Inc.-Newport News Shipbuilding in a teaming arrangement for each of those contracts. General Dynamics Electric Boat is considered the prime contractor in this teaming arrangement.

This report addresses the implementation and use of EVM for the VCS program at Huntington Ingalls Inc.-Newport News Shipbuilding and General Dynamics Electric Boat. It specifically looks at contract numbers N00024-03-C-2101 and N00024-09-C-2104.

Pertinent Guidance

Office of Management and Budget Circular A-11, Part 7, Section 300, “Planning, Budgeting, Acquisition, and Management of Capital Assets,” June 2008,⁴ establishes policy for planning, budgeting, acquisition, and management of Federal capital assets, and provides instructions on budget justification and reporting requirements for major information technology investments. The guidance mandates using earned value techniques to measure performance during the execution of a program with Federal capital investments.

DoD Instruction 5000.2, “Operation of the Defense Acquisition System,” December 2008, identifies EVM implementation as a regulatory requirement for Major Defense Acquisition Programs and Major Automated Information System programs. The instruction requires that contracts meeting certain thresholds use an EVMS that complies with the American National Standards Institute/Electronic Industries Alliance Standard 748 standards.

⁴ Office of Management and Budget Circular A-11, Part 7, Section 300 was updated during our audit in July 2010. Circular A-11 still mandates using earned value techniques to measure performance during the execution of a program with Federal capital investments.

Defense Contract Management Agency’s “Earned Value Management Implementation Guide,” October 2006, was developed to serve as the central EVMS guidance document for DoD personnel. The document provides guidance to be used during the implementation and surveillance of EVMS established in compliance with DoD guidelines. According to this guidance, there are 32 mandatory guidelines formally adopted by DoD and published as an American National Standards Institute/Electronic Industries Alliance standard 748, “Earned Value Management Systems.” The EVMS guidelines describe the desired outcomes of integrated performance management across five broad categories of activity. These five categories are: organization; planning, scheduling, and budgeting; accounting; analysis and management reports; and revisions and data maintenance. Complying with the guidelines ensures that 1) contractors use both an effective management control system and procedures; 2) work is planned, in progress, and completed; and 3) there is properly related cost, schedule, and technical performance.

Government Accountability Office’s “Standards for Internal Controls in the Federal Government,” November 1999, provides that internal control is a major part of managing an organization. It serves as the first line of defense in safeguarding assets, and preventing and detecting errors and fraud. One standard of internal controls is monitoring, which should assess the quality of performance over time and ensure that the findings of audits and other reviews are promptly resolved. Ideally, monitoring should be ongoing and done in the course of normal operations.

Audit Results

EVM was not adequately implemented or used to monitor acquisition program costs, schedules, and performance in accordance with DoD requirements for the VCS program at Huntington Ingalls Inc.-Newport News Shipbuilding and General Dynamics Electric Boat. The audit revealed opportunities for improvement in the following areas:

- Compliance with DoD EVMS policy by the contractors;
- Surveillance efforts of Supervisor of Shipbuilding Newport News and Supervisor of Shipbuilding Groton over the contractors’ EVM implementation; and
- EVM support provided to both Supervisor of Shipbuilding locations by Naval Sea Systems Command and the DON Center for Earned Value Management.

As a result, the Navy could not fully rely on the quality and reporting of EVM information by the contractor for costs, schedules, and technical performance.

EVMS Compliance with DoD Policy

We found that the EVMS implementation for the VCS program by Huntington Ingalls Inc.- Newport News Shipbuilding and General Dynamics Electric Boat was not compliant with the DoD EVMS guidelines (see Exhibits D and E). The contract requires both contractors to maintain and use a validated EVMS that meets the 32 EVMS guidelines in DoD acquisition policy. According to DoD policy, complying with the 32 guidelines ensures that 1) contractors use an effective management control system and procedures; 2) work is planned, in progress, and completed; and 3) there is properly related cost, schedule, and technical performance. Also, compliance with the guidelines ensures that DoD managers receive valid, timely, and auditable contract performance information on which to base prudent management decisions.

At our request, the Defense Contract Management Agency's Earned Value Management Center⁵ assessed the Huntington Ingalls Incorporated-Newport News Shipbuilding and General Dynamics Electric Boat EVMS implementation for the VCS acquisition program. The Defense Contract Management Agency's assessment concluded that the Huntington Ingalls Incorporated-Newport News Shipbuilding application was not fully compliant with 16 of the 32 EVMS guidelines (see Exhibit D). General Dynamics Electric Boat was not fully compliant with 15 of the 32 EVMS guidelines (see Exhibit E). Below are some examples of problems found at both locations.

Huntington Ingalls Incorporated-Newport News Shipbuilding

Some examples of problems found at Huntington Ingalls Incorporated-Newport News Shipbuilding were:

- Earned value was not consistent with the manner in which budgets were planned. For example, of the 66 Key Events on the VCS program (SSN 784), 27 Key Events (40 percent) have differing amounts between the targets compared with the budgets. According to EVMS guidelines, it is critical that the calculation of earned value be based consistently with the manner used to establish the budgets. This ensures a generation of valid variances for analysis purposes. Analysis based on distorted variances does not provide management the insight necessary to focus on areas in need of attention.⁶
- Huntington Ingalls Incorporated-Newport News Shipbuilding was evaluating progress based on the subjective assessment of work in progress, resulting in

⁵ This is the Department of Defense's Executive Agent for EVM.

⁶ In December 2011, the Defense Contract Management Agency and DON issued a memorandum providing clarifying guidance to shipbuilding programs regarding interpretation and application of EVMS guidelines 1, 6, 10, 11, and 21. This memorandum documents the agreement between the Defense Contract Management Agency and DON regarding the five guidelines susceptible to differing interpretations and defines the basis for evaluating and assessing EVMS compliance at shipyards. This additional guidance might have impacted this deficiency identified during audit fieldwork.

skewed performance metrics. Measuring progress based on changing ratios — i.e., a target budget to budget-at-completion ratio — introduces subjectivity to the measurement of earned value. As a result, management is unable to focus on the true and significant problem areas requiring their attention.

- Huntington Ingalls Incorporated-Newport News Shipbuilding had incomplete cost schedule integration between Earned Value data and the scheduling software, Artemis. An analysis of the cost data and Artemis schedule exports identified four SSN Key Events (1.5 million work hours, or 50 percent of the budget at completion) missing from their respective schedules. According to the EVMS guidelines, the contractor should provide for the integration of the company's planning, scheduling, budgeting, work authorization, and cost accumulation processes with each other, and as appropriate, with the program work breakdown structure and program organizational structure. The lack of an integrated management system weakens control processes and allows developing cost, schedule, and performance trends to go undetected. Program managers must be able to continually assess and relate the sufficiency of resources to the amount of work remaining. This cannot be accomplished without the proper integration of all EVMS subsystems and processes. Manual integration can place an undue burden on resources to validate and separate good data from bad data. The lack of integrated systems can also produce invalid, inaccurate, and untimely performance measurement data.
- The Huntington Ingalls Incorporated-Newport News Shipbuilding Integrated Master Schedule could not be used as a viable program management tool in providing current status or forecasting capabilities for use in management decisions for the VCS program. Further, Huntington Ingalls Incorporated-Newport News Shipbuilding could not demonstrate a logic-driven program critical path. The scheduling software did not provide horizontal and vertical integration for all levels of the schedule. Vertical and horizontal integration gives management the ability to predict future performance. It also allows them to model and track the impact of changes to scheduled events, as well as to the critical path. The lack of a fully networked schedule hinders the program office's ability to predict future performance and reflect impact of changes to program milestones and the program critical path.

General Dynamics Electric Boat, Groton, CT

Some examples of problems found at General Dynamics Electric Boat were:

- General Dynamics Electric Boat did not demonstrate that their systems acted as an integrated mechanism for the planning, scheduling, budgeting, work authorization, and cost accumulation processes. The integration of these processes provides the

capability for establishing the Performance Measurement Baseline, identifying work progress, and collecting actual costs. This, in turn, facilitates management analysis and corrective actions. The lack of an integrated management system weakens control processes; allows developing cost, schedule, and performance trends to go undetected; and can also produce invalid, inaccurate, and untimely performance data.

- General Dynamics Electric Boat did not demonstrate a logic-driven program critical path. During the audit, we conducted an independent analysis of the integrated master schedule. The contractor's representation of the program's "controlling paths"⁷ is a manually maintained fishbone chart (a diagram showing cause and effect) of selected critical tasks. However, the chart does not necessarily represent the precedence logic activity sequencing in the Artemis Integrated Master Schedule scheduling software. The lack of fully networked schedules hinders the ability to obtain and validate horizontal and vertical integration and calculate an accurate program critical path and Earned Value metrics. Establishing precedence logic relationships throughout a network enables management to predict future performance, and to reflect the impact of changes to program milestones and the program critical path. The lack of establishing interdependencies between work packages (or lower-level tasks/activities) and the logic network hinders the ability to determine total work time and the critical path through the project.
- General Dynamics Electric Boat was reporting actual costs that were greater than the current estimate of cost at completion. Specifically, an independent data trace of contract performance reports 25 and 26 (Format 1) from April 2010 and July 2010, respectively, found that cumulative actual costs were consistently greater than the estimate of cost at completion for two major milestones, MM30 Section 3 and MM9K Accounting. However, even though they were already exceeding estimates, these contracts were still not 100 percent complete. According to the EVMS guidelines, General Dynamics Electric Boat should develop revised estimates of cost at completion based on performance to date, commitment values for material, and estimates of future conditions. Inaccurate estimates fail to support the customer's ability to provide sufficient funding to the project, and they hinder internal management's visibility into critical resources requirements. They also prevent management from implementing corrective actions to minimize program costs.

⁷ Use of a critical path to manage the integrated master schedule is a contract requirement. The critical path is a sequence of activities in the network that has the longest duration through the project or program. However, General Dynamics Electric Boat analyzes several controlling paths near critical rather than a single critical path through the Artemis network. General Dynamics Electric Boat feels monitoring several controlling paths adds more value than critical path analysis.

Our audit findings indicate that the contractors did not implement and use EVM to manage program costs, schedules, and technical risks in accordance with DoD requirements. Consequently, the contractors did not have, and ultimately the VCS Program Management Office was not provided, valid and reliable cost, schedule, and technical performance information for decision-making purposes. These issues raise concerns regarding both contractors' management processes. This is important because they impact the timeliness, accuracy, reliability, and validity of performance measurement data on which the Naval Sea Systems Command and other Navy leadership rely to manage contracts and make decisions.

Furthermore, in our judgment, in light of the issues described at the two facilities, Defense Contract Management Agency action to conduct a compliance review of both contractors' EVMS and report the results to the Assistant Secretary of the Navy (Research, Development, and Acquisition) may be warranted. Without a thorough compliance review by the Defense Contract Management Agency, DON decision makers will not know the full extent or impact of the contractors' EVMS deficiencies on the VCS program. The Defense Contract Management Agency's EVM Implementation Guide states that after initial acceptance of a contractor's EVMS, no other review will be conducted unless a serious need for one is determined by the Government. In our opinion, the results from our audit demonstrate that a complete compliance review is warranted to assess the overall reliability of both contractors' EVMS.

EVMS Surveillance

Our audit showed that surveillance activities with the Supervisors of Shipbuilding at Newport News and Groton did not ensure the contractors' EVMS complied with the 32 EVMS guidelines. Also, the Defense Contract Management Agency's assessment of the contractors' EVMS identified problems in: baseline maintenance, change control, development of estimates-at-completion, contract cost reporting, managerial analysis, and scheduling. However, the Supervisors of Shipbuilding at Newport News and Groton had not performed active and ongoing surveillance and, therefore, did not identify these deficiencies. This occurred, in part, because neither the DON Center for Earned Value Management nor the Naval Sea Systems Command Headquarters provided sufficient guidance, oversight, and support of the EVMS surveillance programs to ensure EVM implementation in accordance with DoD requirements. Consequently, EVMS surveillance practices were left to the individual field offices with limited assurance that the oversight activities monitored the contractors' EVMS implementation in accordance with DoD requirements. Without effective monitoring, there is limited assurance that data generated from contractors' EVMS is accurate or reliable. Accurate data is critical for making managerial decisions related to costs, schedules, and technical performance of the VCS program.

According to the Defense Contract Management Agency's EVM Implementation Guide, surveillance is required for all contract efforts that require EVM compliance with the American National Standards Institute/Electronic Industries Alliance 748. Active surveillance should commence upon award of the contract and should be ongoing during negotiations with the program manager regarding Memorandum of Agreement developments and/or updates. Surveillance ensures that the contractor's EVMS:

- Provides timely and reliable cost, schedule, and technical performance measurement information, summarized directly from the contractor's internal management system;
- Complies with the 32 EVMS guidelines;
- Provides timely indications of actual or potential problems;
- Maintains baseline integrity;
- Provides information depicting actual conditions and trends; and
- Provides comprehensive variance analysis at the appropriate levels, including proposed actions regarding cost, schedule, technical, and other problem areas.

According to Naval Sea Systems Command policy, Supervisor of Shipbuilding Headquarters (NAVSEA 04Z) should provide policy, guidance, and resourcing to Supervisor of Shipbuilding field offices. At the beginning of our audit, there was no policy, guidance, or oversight from NAVSEA 04Z to the Supervisor of Shipbuilding field offices regarding EVMS surveillance. But during our audit, in October 2010, the command published the NAVSEA Standard Surveillance Operating Procedure. The procedure outlines the requirements and process, including required reporting, for accomplishment of required system surveillance. This procedure provides guidance on the development and use of surveillance plans. Based on Defense Contract Management Agency standard processes and tailored to reflect Naval Sea Systems Command organizational requirements, it outlines the surveillance process and provides the steps for developing a surveillance plan. According to the Supervisors of Shipbuilding at Newport News and Groton, they are both in the process of implementing the surveillance program in accordance with the NAVSEA Standard Surveillance Operating Procedure. Supervisor of Shipbuilding Newport News issued its surveillance plan on 13 December 2011. Supervisor of Shipbuilding Groton plans to issue its surveillance plan by 12 April 2012.

Also, not all of the Supervisor of Shipbuilding monitoring personnel in both Newport News and Groton had received EVMS surveillance training. This limited the analysts' ability to perform analysis and surveillance in accordance with DoD requirements. In order to properly monitor and review the contractor's EVMS, the Supervisor of Shipbuilding personnel should receive training in EVMS surveillance. Although additional training does not necessarily eliminate contractor EVMS problems, it can

provide Supervisor of Shipbuilding personnel with the requisite surveillance knowledge to better identify EVMS compliance problems.

We considered the lack of surveillance and ongoing monitoring of the Huntington Ingalls Incorporated-Newport News Shipbuilding's and General Dynamics Electric Boat's EVMS by Supervisor of Shipbuilding to be a significant breakdown in internal controls. According to the Standards for Internal Controls in the Federal Government, internal control is a major part of managing an organization that serves as the first line of defense in safeguarding assets and preventing and detecting errors and fraud. One standard of internal controls is monitoring, which should assess the quality of performance over time and ensure that the findings of audits and other reviews are promptly resolved. Ideally, monitoring should be ongoing during the course of normal operations. However, for the VCS acquisition program, informal monitoring activities of the contractors' EVMS by personnel at both Supervisors of Shipbuilding were not sufficient to ensure both contractors' continued compliance with the DoD EVMS guidelines.

In our opinion, both Supervisor of Shipbuilding Newport News and Supervisor of Shipbuilding Groton need to improve EVM support for the VCS program. They need to develop and implement a surveillance plan and perform additional surveillance activities to ensure that the contractors' EVMS complies with the 32 EVMS guidelines. The activities also need to ensure that appropriate personnel receive EVMS surveillance training. These things will not necessarily eliminate contractor EVMS problems. However, they can help both Supervisors of Shipbuilding better identify contractor EVMS problems and use that information as a tool in performing formal surveillance.

Reporting and Use of Earned Value Data

As a result of the issues noted above, the VCS Program Management Office may not have had complete and accurate information to exercise informed decision-making and oversight over the VCS contractors' costs, schedules, and technical performance. A primary objective of EVM is to serve as a program management tool providing the Government and the contractor's program manager with visibility over contract costs, schedules, and technical performance. However, the operational weaknesses identified in the EVMS compliance section and the lack of surveillance by the Supervisors of Shipbuilding at Newport News and Groton prevented the program management office from fully relying on the EVM data generated from the contractors' EVMS.

Despite the operational deficiencies identified during EVMS compliance reviews, the VCS Program Management Office stated that they use EVM data extensively in making decisions on the program. According to the program office, biweekly meetings are held with both shipbuilders, the program office, the Supervisors of Shipbuilding, and the Nuclear Propulsion (Naval Reactors) office. Progress on each boat (submarine) under construction is reviewed extensively. This review includes looking at the EVM metrics.

The program office finance group gives a brief to the Program Manager, Naval Reactors, and Supervisors of Shipbuilding that looks at how each boat is doing in terms of cost, schedule, and performance versus available funds. In addition, briefings are given to leadership, based primarily on EVM data that highlights performance issues and the way forward for the shipbuilder. The program office implemented monthly reviews with the shipbuilder to focus on construction performance. In advance of the monthly reviews with the shipbuilder, Supervisor of Shipbuilding completed its analysis and recommendations on performance. Also, in May and June 2011, a “Red Team” comprised of program stakeholders did several site visits to Newport News, focusing on the rationale and potential corrective actions for poor construction performance in some areas. As a result of the Red Team’s review, the poor construction performance was brought to the attention of the contractor, and the contractor took immediate actions and developed an agreed-upon Plan of Action and Milestones. The contractor also briefed Navy management on actions taken as a result of the Red Team review.

The VCS Program Office provided additional information including: 1) quarterly production progress conference and senior leadership briefings, 2) a series of letters with schedule incentives and profit withholds, and 3) informal performance assessment reports indicating which EVM data and analysis is being considered for programmatic decisions. However, even though the program office stated that they rely extensively on EVM data to make decisions, our audit demonstrates that the EVM data generated from the contractors’ EVMS may be inaccurate and unreliable.

Summary

EVM was not implemented on the VCS program in accordance with DoD requirements. The program contractors’ EVM application did not demonstrate compliance with all of the 32 EVMS guidelines. The VCS contract requires the contractors to use EVM to manage the contract. Even though it is not separately priced, the cost of implementing EVM is included in the price of the contracts. Therefore, DON is not receiving full value for program management services and information that are supposed to be included in the contract. Moreover, the VCS Program Management Office did not have assurance of complete and accurate EVMS information to use as a program management tool for making informed decisions over contractors’ costs, schedules, and technical performance. As a result, DON decision makers had limited assurance that reported Earned Value data was accurate, reliable, or complete, and that projected estimates-at-completion were reasonable for the VCS program.

Overall, we consider the conditions in this report to be a significant breakdown in internal controls. Internal controls, which are an integral component of an organization’s management, provide reasonable assurance that the following objectives are achieved:

- Effectiveness and efficiency of operation, including the use of the entity’s resources;

- Reliability of financial reporting, including reports on budget execution, financial statements, and other reports for internal and external use; and
- Compliance with applicable laws and regulations.

Our audit showed that these objectives were not met for the management of the VCS program.

Actions Taken by Management

Subsequent to the completion of our audit field work at Huntington Ingalls-Newport News Shipbuilding and General Dynamics Electric Boat, Supervisors of Shipbuilding at Newport News and Groton have worked with the Defense Contract Management Agency to begin resolving the weaknesses identified during the EVMS reviews. After weaknesses were identified during the audit, both contractors were issued corrective action requests that included the discrepancy reports associated with the weaknesses identified. Both contractors were requested to submit a corrective action plan, as well as plans of action and milestones. Based on the additional information provided by the two activities, both of the contractors are actively working with the Supervisors of Shipbuilding and the Defense Contract Management Agency to quickly resolve the EVMS weaknesses. As a result, some of the discrepancy reports have been closed and require no further action.

Both Supervisor of Shipbuilding locations have completed additional actions to improve their EVM support to the program management office. Supervisor of Shipbuilding Newport News issued an EVMS joint surveillance plan on 13 December 2011 and has begun its surveillance program. Also, three members of the EVM staff have received Defense Acquisition University EVMS surveillance training, and all EVM staff are scheduled to receive EVMS surveillance training from the DON Center for Earned Value Management, NAVSEA 04Z, and the Cost Engineering and Industrial Analysis Division (NAVSEA 05C) in April 2012.

Supervisor of Shipbuilding Groton intends to implement their formal surveillance plan by 12 April 2012. The EVM staff is scheduled to receive EVMS surveillance training from The DON Center for Earned Value Management, NAVSEA 04Z, and NAVSEA 05C in March 2012. Supervisor of Shipbuilding Groton has been submitting quarterly contract dashboard reports to NAVSEA 04Z since the second quarter of 2010 and monthly analysis reports to the program office and NAVSEA 05C. Both reports provide EVM metrics, as well as Supervisor of Shipbuilding Groton's independent assessment of the each boat's progress.

Recommendations

We are not making recommendations in this report. Actions are currently being taken by the DON Center of EVM and the Naval Sea Systems Command as a result of previously identified EVM deficiencies. This should address the internal control weaknesses discussed in this audit report.

Exhibit A:

Background

Department of Defense (DoD) acquisition policy states that Earned Value Management (EVM) is a key integrating process in the management and oversight of acquisition programs. It is a management approach that has evolved from combining both Government management requirements and industry best practices to ensure the total integration of cost, schedule, and work scope aspects of acquisition program contracts. As required by DoD Instruction 5000.02, cost or incentive contracts, subcontracts, intra-Government work agreements, and other agreements valued at or greater than \$20 million in then-year dollars⁸ shall implement the American National Standards Institute/Electronic Industries Alliance Standard 748, EVM System (EVMS). The DoD instruction also requires contractors with cost or incentive contracts, subcontracts, and other agreements valued at or greater than \$50 million in then-year dollars to use an EVMS that: 1) complies with the 32 EVMS guidelines, and 2) has been formally validated and accepted by the cognizant contracting officer.

According to DoD policy, EVM is a tool that allows both Government and contractor program managers to have visibility into technical, cost, and schedule planning, performance, and progress on their contracts. This visibility not only provides insight into contract performance, but also provides Government program managers and contractors with reliable data with which to make responsible management decisions. EVM reduces risk by effectively integrating the investment scope of work with cost, schedule, and performance elements for optimum project planning and control. EVM provides a quantitative measure of project management progress as measured against a performance baseline established from a project's work breakdown structure and project plan. EVM is a methodology that integrates a program's work scope, schedule, and resources to enable Government and contractor management to objectively track program progress throughout the project's life cycle.

In Fiscal Year 2002, the Deputy Assistant Secretary of the Navy (Research, Development, and Acquisition) for Management and Budget (formerly Planning, Programming, and Resources) requested that the Naval Audit Service conduct a series of EVM audits on selected Acquisition Category I and II programs. EVM reports issued to date are: "Earned Value Management at Program Executive Office for Anti-Submarine Warfare Assault and Special Missions Programs" (N2003-0045); "Earned Value Management for the Extended Range Guided Munition Program" (N2004-0057); "Earned Value Management for the DDG-51 Arleigh Burke Class Destroyer Program" (N2005-0056); "Oversight of Earned Value Management for Naval Acquisition Programs" (N2007-0002); "Earned Value Management for the Littoral Combat Ship

⁸ Then-year dollars are current dollars that reflect the impact of inflation over time.

“Freedom” Contract N00024-03-C-2311” (N2008-0015); “Earned Value Management for the Littoral Combat Ship “Independence” Contract N00024-03-C-2310” (N2008-0038) and “Implementation of Earned Value Management for the Future Aircraft Carrier Program” (N2012-0011).

These audits were intended to determine whether program managers and acquisition program contractors were effectively implementing and using EVM to manage their programs. Throughout the series of EVM audits, we engaged technical EVM experts from the Naval Air Systems Command’s EVM Division (NAVAIR 4.2) to obtain technical assessments of contractors’ EVM system applications. As a result, we found that EVM, a primary DoD internal management control process for managing costs, schedules, and performance of acquisition programs, has not functioned as intended. Our EVM audits prior to the Virginia Class Submarine and the Future Aircraft Carrier Programs had identified the following systemic EVM weaknesses:

- Contractors’ EVM systems were mostly noncompliant with many of the 32 mandatory DoD EVM system guidelines;
- Program management offices did not consider EVM data when making critical acquisition decisions about their acquisition programs, and did not ensure that contractors provided the level of EVM data called for in accordance with the terms of contracts;
- Program management offices did not perform complete and formal Integrated Baseline Reviews as required by DoD acquisition policy;
- Naval Sea Systems Command, Space and Naval Warfare Systems Command, the Marine Corps, and the Assistant Secretary of the Navy (Research, Development, and Acquisition) provided limited or no EVM oversight and support to Naval acquisition program management offices;
- The Defense Contract Management Agency and Supervisor of Shipbuilding Contract Management Offices did not provide adequate program and system surveillance activities to ensure that contractors’ EVMS continued to comply with the 32 EVM system guidelines after initial certification. In its advisory role, the Defense Contract Audit Agency did not adequately support the contract management offices’ surveillance program; and
- Defense Contract Management Agency and Supervisor of Shipbuilding personnel, who were monitoring contractors’ EVMS compliance activities, did not receive EVMS surveillance training.

Exhibit B:

Scope and Methodology

We contacted the commands and activities listed in Exhibit C in preparation for this audit report. Our work was conducted from 29 September 2009 to 5 April 2012. Due to the delays in visiting the contractors' facilities, as well as schedule conflicts when coordinating site visits, the cycle time to complete this audit was significantly impacted. We conducted this performance audit in accordance with Generally Accepted Government Auditing Standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

We reviewed management controls relating to Department of Defense and Department of the Navy (DON) policies and procedures applicable to Earned Value Management (EVM). We reviewed transactions from February 2009 through October 2010. We examined program documentation, including: monthly contract performance reports, contractor system descriptions, contract correspondence and documentation, and acquisition program documentation (including the acquisition strategy report, acquisition plan, and other documentation). During our visits to the contractors' facilities, we held discussions with the on-site personnel from Supervisor of Shipbuilding Newport News, VA; Supervisor of Shipbuilding Groton, CT; Defense Contract Audit Agency; and the contractor.

We reviewed documentation to evaluate the EVM processes. We also evaluated involvement in monitoring the contractors' EVM processes by Supervisor of Shipbuilding Newport News and Supervisor of Shipbuilding Groton. In addition, we discussed issues with the Under Secretary of the Navy; Assistant Secretary of the Navy (Research, Development, and Acquisition); the Deputy Assistant Secretary of the Navy for Management and Budget and the Virginia Class Program (VCS) Management Office.

We did not use data-mining for this audit. Instead, we engaged EVM subject matter experts from the Defense Contract Management Agency to obtain technical assessments of the contractor's EVM System (EVMS) application on the VCS acquisition program. We exercised due professional care in overseeing their work. The technical assessment included verifying that: (1) the contractors' processes, procedures, and methods are compliant with the EVMS guidelines; (2) the descriptive documents, including the contractors' policies and procedures, are being used in actual operations; and (3) the EVMS data is used in the management of the programs. Our due professional care included:

- Discussing our expectations and desired results from the assessment with the subject matter experts;
- Evaluating the reasonableness of the experts' plans and methodology;
- Observing and participating in meetings of the experts and contractor representatives during the assessment; and
- Reviewing and discussing the results, and draft and final reports.

Also, as part of their technical assessment of the contractors' EVMS, the subject matter experts ran a standard set of cost, schedule, and integration metrics to test the accuracy and completeness of the data generated by the EVMS. Specifically, some of the metrics included: comparing the total number of records provided to the companies' totals; reviewing related documentation; using different EVM formulas to test relationships between data elements; tracing a sample of data records to source documents; tracing source documents to the data; and conducting interviews with control account managers responsible for the area being evaluated. In our judgment, the accuracy of the EVM data is questionable based on what we evaluated during the EVMS review (see the Finding).

We did not identify any Naval Audit Service, Department of Defense Inspector General, or Government Accountability Office reports issued within 5 years that addressed the same or similar issues related to the acquisition program reviewed. Therefore, followup on a previous report was not required. However, we did review EVM review reports from the DON Center for EVM, and audit reports from the Defense Contract Audit Agency.

Exhibit C:

Activities Visited and/or Contacted

Office of the Secretary of Defense, Performance Assessment and Root Cause Analysis Group, Washington, DC

Office of the Under Secretary of the Navy, Washington, DC

Office of the Assistant Secretary of the Navy (Research, Development, and Acquisition), Washington, DC

- Assistant Secretary of the Navy (Research, Development, and Acquisition)
- Deputy Assistant Secretary of the Navy (Management and Budget)

Office of the Commander, Naval Sea Systems Command, Washington, DC

- Cost Engineering and Industrial Analysis Division (SEA-05C)
- Future Aircraft Carrier Program Management Office (PMS 378)
- Virginia Class Submarine Program Management Office (PMS 450)
- Supervisor of Shipbuilding, Management Group (NAVSEA 04Z)*

Supervisor of Shipbuilding, Newport News, VA

Supervisor of Shipbuilding, Groton, CT

Defense Contract Management Agency, Center for EVM, Alexandria, VA

Defense Contract Audit Agency, Newport News, VA

Defense Contract Audit Agency, Groton, CT

*Activities contacted

FOUC (FOIA) (b)(4) Exhibit D:

EVM System Compliance Matrix for Huntington Ingalls Inc., Newport News, VA

Element	Guideline	Description	Compliant	Non-Compliant
Organization	1	Define authorized work	<div style="background-color: black; color: white; padding: 10px; text-align: center;"> FOIA (b)(4) </div>	
	2	Identify program organization structure		
	3	Compare integration of EVMS subsystems with WBS and OBS		
	4	Identify organization function for overhead		
	5	Integrate WBS and OBS, create control accounts		
Planning, Scheduling, and Budgeting	6	Sequential scheduling of work		
	7	Identify interim measurements of progress (i.e. milestones, products, etc.)		
	8	Establish time-phased budget		
	9	Identify significant cost elements within authorized budgets		
	10	Identify discrete work packages		
	11	All work package budgets and planning packages sum to control accounts		
	12	Identify and control LOE budgets		
	13	Establish overhead budgets by organization element		
	14	Identify management reserve and undistributed budget		
	15	Reconcile program target cost goal with sum of all internal budgets		
Accounting Considerations	16	Record direct costs from accounting system		
	17	Summarize direct costs into WBS without allocation		
	18	Summarize direct costs into OBS without allocation		
	19	Record indirect costs		
	20	Identify unit costs, equivalent units costs or lot costs		
	21	Accurate material cost accumulation by control accounts; EV measurement at right time; full accountability of material		
Analysis and Managerial Reports	22	Control account monthly summary, identification of CV and SV		
	23	Explain significant variances		
	24	Identify and explain indirect cost variances		
	25	Summarize data elements and variances thru WBS/OBS for management		
	26	Implement management actions as a result of EVM analysis		
	27	Revised EAC based on performance data; calculate VAC		
Revisions and Data Maintenance	28	Incorporate authorized changes in a timely manner		
	29	Reconcile budgets with prior budgets		
	30	Control retroactive changes		
	31	Prevent all but authorized budget changes		
	32	Document changes to PMB		
		Totals		

KEY

EVM: Earned Value Management

WBS: Work Breakdown Structure

OBS: Organization Breakdown Structure

LOE: Level of Effort

EV: Earned Value

CV: Cost Variance

SV: Schedule Variance

VAC: Variance at Completion

EAC: Estimate at Completion

PMB: Performance Measurement Baseline

FOUO (FOIA) (b)(4) Exhibit E:

EVM System Compliance Matrix for General Dynamics Electric Boat, Groton, CT

Element	Guideline	Description	Compliant	Non-Compliant
Organization	1	Define authorized work		
	2	Identify program organization structure		
	3	Company integration of EVMS subsystems with WBS and OBS		
	4	Identify organization/function for overhead		
	5	Integrate WBS and OBS, create control accounts		
Planning, Scheduling, and Budgeting	6	Sequential scheduling of work		
	7	Identify interim measurements of progress (i.e. milestones, products, etc.)		
	8	Establish time-phased budget		
	9	Identify significant cost elements within authorized budgets		
	10	Identify discrete work packages		
	11	All work package budgets and planning packages sum to control accounts		
	12	Identify and control LOE budgets		
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Analysis and Managerial Reports	22	Control account monthly summary, identification of CV and SV		
	23	Explain significant variances		
	24	Identify and explain indirect cost variances		
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	26	Implement management actions as a results of EVM analysis		
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	29	Reconcile budgets with prior budgets		
	30	Control retroactive changes		
	31	Prevent all but authorized budget changes		
	32	Document changes to PMB		
		Totals		

FOIA (b)(4)

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VAC: Variance at Completion

EAC: Estimate at Completion

PMB: Performance Measurement Baseline

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