

*U.S. DEPARTMENT OF COMMERCE*  
*Office of Inspector General*

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RELEASE**

*OFFICE OF THE SECRETARY*

*Improvements Needed in Controls Over  
Approvals for and Testing of  
CAMS Software*

*Final Audit Report No. FSD-12940/September 2000*

*Office of Audits, Financial Statements Audits Division*





**UNITED STATES DEPARTMENT OF COMMERCE**  
**The Inspector General**  
Washington, D.C. 20230

September 20, 2000

**MEMORANDUM FOR:** Linda J. Bilmes  
Chief Financial Officer and  
Assistant Secretary for Administration  
Office of the Secretary

**FROM:**

Johnnie E. Frazier

**SUBJECT:**

*Improvements Needed in Controls Over Approvals for and  
Testing of CAMS Software*  
Final Audit Report No. FSD-12940

This is our final audit report on the adequacy of controls over approvals for and testing of the Commerce Administrative Management System (CAMS) software. Our audit found that although the CAMS Support Center has taken action during the last two years to strengthen controls over CAMS software, some CAMS Support Center management positions with conflicting responsibilities are held by the same personnel and that most decisions to change CAMS have not been adequately documented. Also, we found that system testing of most modules is not performed, and system documentation does not reflect the current state of software. We recommend that corrective actions be taken to ensure that (1) all conflicting duties are segregated, (2) decisions that support changes to CAMS are documented, and (3) policies and procedures regarding system testing and system documentation are followed. (See pages 5-9.)

Your office's response to the draft report expressed general agreement with the findings and recommendations, and noted corrective actions already taken. We have, where appropriate, incorporated your suggested changes and comments into this final report. Your complete response is included as an attachment to the report.

Please provide your audit action plan addressing the recommendations for our concurrence within 60 days of the date of this memorandum in accordance with Department Administrative Order (DAO) 213-5. The plan should be in the format of Exhibit 7 of the DAO. Should you have any questions regarding preparation of the audit action plan, please contact me at (202) 482-4661 or Thomas McCaughey, Director, Financial Statements Audits Division, at (202) 482-6044.

We appreciate the cooperation and courtesies extended to us by your staff during the review.

## INTRODUCTION

This final report presents the results of our audit of the CAMS Support Center's controls over application software development and change control. Application software development and change control helps to prevent the implementation of unauthorized programs or modifications to existing programs. In conducting this financial systems audit, we used the General Accounting Office's (GAO) *Federal Information System Controls Audit Manual (FISCAM)* as a guide in our assessment. On February 22, 2000, we issued audit report No. FSD-11846-0-0001, *Improvements Needed in the General Controls at the Commerce Administrative Management System Support Center*, which addresses the other five FISCAM areas<sup>1</sup> and is a restricted, limited-distribution report.

Since fiscal year 1989, the Department's lack of a single, integrated financial system has been reported as a material internal control weakness in the Secretary's annual reports to the President under the Federal Managers' Financial Integrity Act. To correct this weakness, the Department began the development and acquisition of CAMS, which consists of a core financial system containing six integrated modules,<sup>2</sup> and is to be integrated with Department-wide functional systems. Currently, CAMS is functional at the Census Bureau, and EDA is using the Accounts Receivable and Accounts Payable modules. NOAA has implemented the Travel Manager module in CAMS, the Small Purchases module, and a majority of the Accounts Payable module. NOAA also has begun implementing the Purchase Card module. For fiscal year 2001, the Department plans to have the Office of Secretary operational, followed by other clients that are cross-serviced by NIST. By fiscal year 2002, NOAA's CAMS pilot at the National Oceans Survey is to be in production, and NIST will begin phased implementation. The Department projects that CAMS will be fully implemented by fiscal year 2004.

Oversight of the CAMS program is the responsibility of the CAMS Executive Board, which sets policy, provides budget and resources for implementation, gives guidance when conflicts of priorities occur, and reports to the Department's Chief Financial Officer (CFO) through the Deputy CFO. The Deputy CFO has operational control over the CAMS Support Center, located in Gaithersburg, Maryland. The Support Center, through the use of contractors, is responsible for making changes to CAMS as part of its software development and implementation activities.

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<sup>1</sup> Entitywide security program planning and management, access control, system software, segregation of duties, and service continuity.

<sup>2</sup> General Ledger, Accounts Payable, Accounts Receivable, Cost Accumulation, Budget/Funds Management, and Financial Reporting.

These changes are first assessed by the Technical Advisory Council<sup>3</sup> (TAC), which provides a recommendation to the Software Change Control Board<sup>4</sup> (SCCB) for a decision. Items that significantly affect resource utilization or prioritization are elevated to the CAMS Executive Board for resolution. As of May 1, 2000, the Support Center had 30 government employees and 58 contractor employees.

The Support Center has three divisions:

- The **Technical Support Division** performs application software design, programming, and maintenance; manages the CAMS software change release and system architecture; tests software; and provides support for the Support Center's internal infrastructure.
- The **System Support Division** handles the functional aspects of CAMS, provides customer support to the bureaus, and maintains system documentation and CAMS training materials. This division is also responsible for inspecting the software for quality assurance and control.
- The **Program Support Division** provides support for general and contract administration,<sup>5</sup> and program management for performance measurement and independent verification and validation of CAMS and the Support Center.

Over the past 2 years, the Support Center has taken steps to improve its operations. For example, the Support Center has started the process for implementing the Capability Maturity Model for Software,<sup>6</sup> and for attaining the model's Level 2 maturity level – where development processes are considered “repeatable.” This level permits management to institutionalize successful processes developed on earlier projects. In addition, the Support Center involves

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<sup>3</sup> The TAC is chaired by the Support Center's functional architect and is composed of bureau functional and information technology system experts. The TAC is to assess proposed changes' software functionality, technical feasibility, and impacts on performance, and to recommend approaches to the Software Change Control Board.

<sup>4</sup> The SCCB is chaired by the Support Center's Program Manager and is composed of the bureaus' financial officers and CAMS implementation managers. The SCCB votes on the proposed changes to CAMS functionality and requirements that are proposed by the TAC.

<sup>5</sup> NOAA also provides support to the CAMS Support Center for contract administration.

<sup>6</sup> The model, developed by the Software Engineering Institute of Carnegie Mellon University, is used to judge the maturity of an organization's software processes and to identify the key practices that are required to increase the maturity of these processes.

Commerce bureaus in defining CAMS change requirements, is establishing a formal quality assurance process over its software development, and uses lessons-learned practices for assessing its recently revised software release cycle.

The audit was conducted in accordance with *Government Auditing Standards* issued by the Comptroller General of the United States, and was performed under the authority of the Inspector General Act of 1978, as amended, and Department Organization Order 10-13, dated May 22, 1980, as amended.

## **OBJECTIVES, SCOPE, AND METHODOLOGY**

The audit's objective was to determine whether the CAMS Support Center had established adequate controls over the approvals for and modification of CAMS software. The scope of the audit was to assess the existence of (1) proper authorizations for processing features and program modifications, (2) adequate tests and approvals for new and revised software, and (3) proper controls over software libraries. We address our concerns for the first and second objectives in the following sections. We did not identify any deficiencies for the third objective during our review. We did not perform tests<sup>7</sup> of the Support Center's workload regarding change requests<sup>8</sup> to CAMS software because the Support Center had only formalized and issued its new software development and maintenance procedures on May 8, 2000. Of the 633 change requests logged for fiscal year 2000 (as of May 17, 2000), only 35 (6 percent) had been made under these new procedures; thus, historical data was too limited for us to make a valid conclusion.

We performed our review from April through June 2000 by interviewing Support Center management and staff; reviewing policies and procedures, change request workload, and quality assurance processes; identifying and assessing control techniques consistent with current industry standards and compliance with government guidelines and regulations; gaining an understanding of the general controls structure surrounding the Support Center's software development and maintenance environment; and assessing risks surrounding the areas of key management and software development and change control. During the review and at its conclusion, we discussed our findings with the Support Center's program manager and division directors.

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<sup>7</sup> Such tests usually include evaluating whether the requests were documented in accordance with policies and procedures, prioritized based on criticality, reviewed by management, authorized/approved for programming, and adequately tested.

<sup>8</sup> A change request (activity request) provides the Support Center with an overview of the software problem and serves as a starting point for further functional and technical analysis.

## FINDINGS AND RECOMMENDATIONS

### I. Additional Improvements Are Necessary for the Controls over Approvals of Software Features and Modifications

The Support Center formalized and issued new software development and maintenance procedures on May 8, 2000. Our review found that, although the Support Center has taken actions to improve its operations, additional improvements are needed in the controls over approvals of CAMS software features and change modifications. Specifically, we found that some CAMS Support Center management positions with conflicting responsibilities are held by the same personnel, and that decisions to change CAMS have not been adequately documented.

#### A. *Some CAMS Support Center management positions with conflicting responsibilities are held by the same personnel*

While assessing the key management controls in place at the Support Center, we found that some management positions with conflicting responsibilities are held by the same personnel. For instance, a lack of segregation of duties exists because the director positions for the Technical Support Division (TSD) and the Systems Support Division (SSD) are currently handled by the same person. According to documentation provided by the Support Center, one of TSD's main responsibilities is to maintain and develop program code that implements approved CAMS changes and enhancements, while SSD is responsible for improving software quality by enforcing compliance with development standards. With the same individual responsible for overseeing and administering both of these areas, excessive emphasis placed on one area could result in deficiencies remaining unaddressed in the other.

GAO's *Standards for Internal Control in the Federal Government*, issued in November 1999, state that program managers should implement appropriate and effective internal controls to better achieve program results and to help in managing change from shifting environments and evolving demands and priorities. Internal control activities, such as approvals and authorizations, aid in the segregation of duties, and should be used to ensure that management directives are carried out.

Although the Support Center maintained that the lack of segregation of duties has resulted from a shortage of personnel,<sup>9</sup> we believe that sound business practices, policies, and procedures for

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<sup>9</sup> As of May 2, 2000, there were nine vacancies at the Support Center (one director, four team leaders, three computer specialists, and one team member). The Support Center management had shifted responsibilities from some of these vacant positions to existing staff.

segregation of duties should be implemented as mitigating controls. By allowing one person to have responsibility over conflicting duties, effective planning and management lessen and risks increase.

***B. Decisions to change CAMS have not been adequately documented***

Decisions made by the CAMS Software Change Control Board were not documented. Documentation for decisions that support approved changes to CAMS should include (1) input received from the bureaus, (2) the potential impact of each change on the Support Center's activities and workload, and (3) any recommendations to the CAMS Executive Board. The Support Center could not provide us with documentation concerning decisions made by the SCCB on proposed CAMS software changes. Nor could the Support Center provide us with documentation on its briefings to the CAMS Executive Board regarding proposed changes to CAMS and the resulting Executive Board decisions. The Support Center maintained only the CAMS Executive Board's agendas on topics for discussion.

As previously mentioned, the SCCB is chaired by the Support Center's Program Manager and is composed of the bureaus' financial officers and CAMS implementation managers. The SCCB's responsibility is to vote on the proposed changes to CAMS functionality software and requirements that are proposed by the TAC. In addition, the SCCB is to set priorities for software modifications to be performed by the Support Center.

GAO's *Standards for Internal Control in the Federal Government* state that internal control activities help to ensure that management directives are carried out. Maintaining appropriate documentation of approvals or disapprovals of proposed changes is one of these activities. Internal controls such as approvals need to be clearly documented, and documentation should be readily available for examination.

We found that when the TAC decided on proposed changes to CAMS, it notified the SCCB; however, the SCCB's decisions were not documented. To illustrate, on September 23, 1999, the Census Bureau and the Support Center agreed through two memorandums of understanding (MOU) to have the Support Center provide software development services to Census. The Support Center was to complete the design and programming of an archiving module for CAMS and to deliver the module's software to Census upon completion. Census noted that this module would provide the means for removing transactions from online processing, retiring transactions, and providing access to archived transactions as needed. The MOUs' performance periods were from September 1999 through September 2000, and through the MOUs, Census provided over \$340,000 to the Support Center for the work to be done. However, documentation of the SCCB's decision on these MOUs—either approval or disapproval—was not maintained.

Even though the Support Center has experienced software development personnel who have historical knowledge of the system and its requirements, GAO's standards requiring the maintenance of adequate approval documentation for changes to CAMS have not been adequately followed. Failing to document approvals limits management's ability to support and justify its decisions.

### **C. Recommendations**

We recommend that the Director for Financial Management and Deputy CFO require the CAMS Support Center Program Manager to:

1. Segregate duties having conflicting internal control responsibilities.
2. Implement and enforce GAO's standards to document all decisions that support approved changes to CAMS. Such documentation should include (a) input received from the bureaus, (b) the potential impact of each approved change on the Support Center's activities and workload, (c) the CAMS Software Change Control Board decisions, and (d) the Support Center's briefings to the CAMS Executive Board regarding proposed changes to CAMS and the resulting Executive Board decisions.

### **Director for Financial Management and Deputy CFO's Response and OIG Comments**

In his written response to the draft report, the Director and Deputy CFO agreed with our findings and recommendations and stated that corrective actions have been initiated. On July 20, 2000, the Support Center hired a new Director for TSD. Further, the Support Center will have each proposed software change go through functional and technical assessments and obtain approvals from both TSD and SSD. Also, between June 20 and August 7, 2000, the Support Center reported that it provided training for all its government staff on how to conduct and document effective meetings and that documentation will be enforced as a policy for all decision bodies associated with CAMS. The actions are consistent with the intent of the recommendations.

### **II. Improvements Are Still Needed in Controls over Testing of New and Revised Software**

The Support Center does not perform system (regression) testing of most CAMS modules. System testing verifies that changes or additions to CAMS software have not caused unintended effects to CAMS and also examines the operation of CAMS as an overall entity or system. In addition, system documentation was not updated to reflect the current state of CAMS software code.



**A. System Testing Is Not Performed for Most CAMS Modules**

After reviewing the Support Center's processes, practices, and documentation and interviewing key management officials, we found that system testing was performed for only the Accounts Payable module, which uses over 800 automated test scripts for testing. Though test scripts are available for other CAMS modules, the Support Center had not programmed them into the testing software. The Support Center stated that the reason for not fully testing most modules is the shortage of personnel.

GAO's FISCAM establishes control guidance for application software development and change control. The manual states that software should undergo a disciplined process of testing and approval prior to implementation in order to ensure that it operates as intended. Such testing should include unit, integration, and system testing.

We believe that sound business practices, policies, and procedures for determining the appropriate level of software testing that should occur have not been adequately followed. A lack of complete system testing reduces the Support Center's assurances that software will operate as intended.

**B. System Documentation Does Not Reflect the Current State of the CAMS Software**

CAMS system documentation has not been updated to reflect the current state of the software. On November 22, 1999, an independent software-process appraiser contracted to assess the Support Center's software maturity level reported that the documentation was "woefully" out of date. Internal policies and procedures promulgated by the Support Center for updating existing system documentation have not been adequately followed. The system documentation needs to be updated in order to reflect the current software version. As GAO has stated,<sup>10</sup> controls over the design, development, and modification of application software help prevent security features from being inadvertently or deliberately turned off and process irregularities or malicious code from being introduced. During our audit, the Support Center, through one of its contractors, provided an individual to maintain the documentation.

FISCAM provides control guidance over changes in programming and developing related changes to system documentation, including hardware documentation, operating procedures, and user procedures. System documentation will facilitate coding and testing of future modifications.

The lack of adequate documentation increases the risk that CAMS software may not meet operational needs. Also, outdated system documentation could result in significant delays and

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<sup>10</sup> *Financial Management Service - Significant Weaknesses in Computer Controls*, GAO/AIMD-00-4, October 9, 1999.

costs when future modifications are made to the software. Given the Department's lengthy history of implementing CAMS, coupled with CAMS Support Center staff turnovers, we believe that system documentation is important to ensure continued operations.

### ***C. Recommendations***

We recommend that the Director for Financial Management and Deputy CFO require the CAMS Support Center Program Manager to:

1. Enforce policies and procedures for performing system (regression) testing of all CAMS modules and ensure that the results are documented.
2. Adhere to policies and procedures that require system documentation to be updated as changes are made to accurately reflect the current version of software.

### **Director for Financial Management and Deputy CFO's Response and OIG Comments**

The Director and Deputy CFO agreed with our findings and recommendations and stated that corrective actions have been initiated. On May 23, 2000, the Support Center awarded and tasked its contractor to provide additional testing staff as part of the Support Center's technology migration/refreshment effort. The Support Center projects that when this effort is completed in May 2001, test scripts will have been loaded into the automated testing software for all CAMS modules and changes thereafter to the CAMS software will be subjected to full system testing. In addition, the Support Center will have the new Director for TSD assess the state of and need for internal systems documentation of CAMS and will develop a plan by September 30, 2000. In fiscal year 2001, the Support Center will begin efforts to rectify the lack of user documentation. These actions are consistent with the intent of the recommendations.

Attachment

cc: James L. Taylor, Director for Financial Management and Deputy Chief Financial Officer  
Robert R. Bair, CAMS Support Center Program Manager  
Roger W. Baker, Chief Information Officer



ATTACHMENT  
**UNITED STATES DEPARTMENT OF COMMERCE**  
**Chief Financial Officer**  
**Assistant Secretary for Administration**  
Washington, D.C. 20230

AUG 31 2000

**MEMORANDUM FOR** Ed Blansitt  
Acting Assistant Inspector General for Audits

**FROM:** James L. Taylor  
Director for Financial Management and  
Deputy Chief Financial Officer

**SUBJECT:** Improvements Needed in Controls Over Approvals for and Testing  
of CAMS Software  
Draft Audit Report No. FSD-12940/August 2000

Thank you for providing us the opportunity to comment on the Draft Audit Report No. FSD-12940, Improvements Needed in Controls Over Approvals for and Testing of CAMS Software. In general, we agree with the findings and recommendations, and we plan to implement all recommendations. Below are our specific comments on the report.

**Introduction - Page 2**

1. The fourth sentence of the first paragraph should read "NOAA has implemented the Travel Manager module in CAMS, the small purchases module, and a majority of the accounts payable module. NOAA also has begun implementing the purchase card module."
2. The fifth sentence of the first paragraph should read " By fiscal year 2002, NOAA's CAMS pilot at the National Oceans Survey is to be in production, and NIST will begin phased implementation."

**Findings and Recommendations - Page 5**

3. In section I.A, the CSC already has made this correction by hiring Myrian Myer as Director, Technical Support Division, and by assuring that each proposed software change goes through the functional and technical assessments and approvals of both divisions.
4. In section I.B, the CSC has provided training for all government staff on how to conduct effective meetings. The course stressed full documentation of all meetings and decisions. Documentation will be enforced as a policy for all decision bodies associated with CAMS.

**Findings and Recommendations - Page 7**

5. In section II.A, we have tasked our contractors to provide additional testing staff to the CSC as part of our technology migration/refreshment effort. When this effort is concluded, we will have loaded tests scripts for all modules of CAMS into the automated testing software. From that point forward, any changes to CAMS software will be subject to full regression testing. The projected completion date for this technology migration/refreshment effort is May 2001.

**Findings and Recommendations - Page 8**

6. In section II.B, the new Director, Technical Support Division, will assess the state and need for internal systems documentation of CAMS and will develop a plan by September 30, 2000. User documentation requirements will be assessed by a cross-bureau team and recommendations on how to improve existing documentation will be delivered in the first quarter of FY 2001. The CSC will develop a project plan on user documentation and will begin to implement the plan in calendar 2001, with the level and duration of the effort dependent on availability of FY 2001 funding.

cc: Robert Bair  
Linda J. Bilmes  
Lisa Casias  
Myrian Myer  
Raul Perea-Henze  
John Sansing  
Bill Starr