



STATE OF NORTH CAROLINA

AUDIT OF THE INFORMATION SYSTEM GENERAL CONTROLS

AT

MONTGOMERY COMMUNITY COLLEGE

TROY, NORTH CAROLINA

JUNE 2004

OFFICE OF THE STATE AUDITOR

RALPH CAMPBELL, JR.

STATE AUDITOR

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Ralph Campbell, Jr.
State Auditor

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AUDITOR'S TRANSMITTAL

The Honorable Michael F. Easley, Governor
Members of the North Carolina General Assembly
The Board of Directors of Montgomery Community College
Dr. Mary P. Kirk, President

Ladies and Gentlemen:

We have completed our information systems (IS) audit of Montgomery Community College. The audit was conducted in accordance with *Government Auditing Standards* and *Information Systems Audit Standards*.

The primary objective of this audit was to evaluate IS general controls at Montgomery Community College. The scope of our IS general controls audit included general security, access controls, program maintenance, systems software, physical security, and disaster recovery. Other IS general control topics were reviewed as considered necessary.

This report contains an executive summary that highlights the areas where Montgomery Community College has performed satisfactorily and where improvements should be made.

We wish to express our appreciation to the staff at Montgomery Community College for the courtesy, cooperation, and assistance provided to us during this audit.

North Carolina General Statutes require the State Auditor to make audit reports available to the public. Copies of audit reports issued by the Office of the State Auditor may be obtained through one of the options listed in the back of this report.

Respectfully submitted,

A handwritten signature in black ink that reads "Ralph Campbell, Jr." in a cursive script.

Ralph Campbell, Jr.
State Auditor

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EXECUTIVE SUMMARY

We conducted an information system (IS) audit at Montgomery Community College (CC) from April 4, 2003 - April 30, 2004. The primary objective of this audit was to evaluate the IS general controls in place during that period. Based on our objective, we report the following conclusions.

General security involves the establishment of a reasonable security program that addresses the general security of information resources. We found that Montgomery Community College should adopt formal standards for information technology (IT) to improve the IT Security Policies and Procedures. *See Audit Finding 1, IT Security Policies and Procedures.*

The **access control** environment consists of access control software and information security policies and procedures. We reviewed the access controls for Montgomery Community College's critical operating systems. We found several weaknesses in access controls. Due to the sensitive nature of the conditions found, we have conveyed these findings to management in a separate letter pursuant to the provision of *North Carolina General Statute 147-64.6(c)(18)*.

Program maintenance primarily involves enhancements or changes needed to existing systems. Because the same procedures are used to patch and upgrade the critical application and the operating system, we indirectly tested program changes to the critical application in our test of system software maintenance.

Systems software is the collection of programs that drive the computer. The selection of systems software should be properly approved and the software should be maintained by the computer center. We found a significant weakness in systems software maintenance. Due to the sensitive nature of the condition found, we have conveyed this finding to management in a separate letter pursuant to the provision of *North Carolina General Statute 147-64.6(c)(18)*.

Physical security primarily involves the inspection of the College's computer center for the controls that should reasonably secure the operations of the computer center from foreseeable and preventable threats from fire, water, electrical problems, and vandalism. Montgomery Community College computer center is not secure from foreseeable and preventable security and environmental threats. *See Audit Finding 2, Physical Security of the Computer Processing Facility.*

A complete **disaster recovery** plan that is tested periodically is necessary to enable the College to recover from an extended business interruption due to the destruction of the computer center or other College assets. Montgomery Community College has a Disaster Recovery Plan, however, the plan is incomplete. *See Audit Finding 3, Resumption of Computer Systems.*

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AUDIT OBJECTIVES, SCOPE, AND METHODOLOGY

OBJECTIVES

Under the *North Carolina General Statutes* Chapter 147-64.6, the State Auditor is responsible for examining and evaluating the adequacy of operating and administrative procedures and practices, systems of accounting, and other elements of State agencies. This IS audit was designed to ascertain the effectiveness of general controls at Montgomery Community College.

SCOPE

General controls govern the operation and management of computer processing activities. The scope of our IS general controls audit was to review general security issues, access controls, program maintenance, systems software, physical security, operations procedures, and disaster recovery which directly affect Montgomery Community College computing operations. Other IS general control topics were reviewed as considered necessary.

METHODOLOGY

We audited policies and procedures, used questionnaires to interview key administrators and other personnel, developed a program to generate information from the critical operating systems to examine system configurations, toured the computer facility, tested on-line system controls, reviewed appropriate technical literature, reviewed computer generated reports, and used security evaluation software in our audit of controls. We conducted our audit in accordance with the standards applicable to performance audits contained in *Government Auditing Standards* issued by the Comptroller General of the United States and *Information Systems Audit Standards* issued by the Information Systems Audit and Control Association.¹

¹ In 1992 the State created the Information Resource Management Commission to provide statewide coordination of information technology resources planning. The IRMC provides state enterprise IT leadership including increased emphasis and oversight for strategic information technology planning and management; policy development; technical architecture; and project certification. Pursuant to *North Carolina General Statute* 147-33.78 numerous state officials serve on the IRMC including four members of the Council of State who are appointed by the Governor. The State Auditor has been appointed a member of the IRMC and elected as chair of the IRMC by its members.

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BACKGROUND INFORMATION

The State Board of Education issued a charter to Montgomery Technical Institute on September 7, 1967. Montgomery Community College is accredited by the Southern Association of Colleges and Schools to awards associate degrees, diplomas and certificates. Montgomery Community College is located in Troy, NC, which is in the center of the state, approximately an hour drive from the cities of Charlotte, Greensboro, Fayetteville, and Raleigh. Montgomery Community College offers comprehensive occupational, general, and continuing education programs, as well as community service activities for Montgomery County and surrounding areas.

Computer services are offered through the Information Technology Division and is headed by the Dean of Information Technology. The Dean of Information Technology reports directly to the College President. The Information Technology Division provides all information technology support and services, including voice, data, video/audio and the North Carolina Information Highway, to all Montgomery Community College employees. The mission of the Information Technology Division is to provide information technology support and services; to strive to empower faculty and staff to effectively utilize technology resources in the most cost-effective manner; and to strive for professional development through education and application of skills.

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AUDIT RESULTS AND AUDITEE RESPONSES

The following audit results reflect the areas where Montgomery Community College has performed satisfactorily and where recommendations have been made for improvement.

GENERAL SECURITY ISSUES

General security issues involve the maintenance of a sound security management structure. A sound security management structure should include a method of classifying and establishing ownership of resources, proper segregation of duties, a security organization and resources, policies regarding access to the computer systems and a security education program.

AUDIT FINDING 1: IT SECURITY POLICIES AND PROCEDURES

North Carolina Community College System (NCCCS) and Montgomery Community College's (CC) management has not adopted formal information technology (IT) standards to help them address all critical areas of their IT security environment. The following critical policies and procedures were not addressed in their security program:

- Montgomery CC has no written standards or policies and procedures regarding the monitoring of critical operating systems and servers, or how to respond to security threats. In addition, users are not required to document that they understand the existing security policies and procedures. Without adding these critical components to a security program, management has not appropriately communicated to the Montgomery CC staff its overall approach to security and internal control in these aforementioned critical areas.
- Montgomery CC users are not required to document that they understand the existing security policies and procedures and the proper use of the network. Consequently, users may be able to avoid penalties associated with violating the existing security policies and improperly using the networks because no document exist to show that users were made aware of these policies and restrictions.
- NCCCS has not provided Montgomery CC with a baseline configuration for securing the critical operating system. The critical operating systems may not be secure from commonly known vulnerabilities.
- Montgomery CC has not performed a risk assessment of their critical operations. Without a risk assessment, management has not determined which areas are deemed critical and how to prioritize resources and time to ensure that the critical areas remain effective.

NCCCS and Montgomery CC's management should assume full responsibility for developing a framework policy, which establishes the organization's overall approach to security and internal control. The policy should comply with overall business objectives and be aimed at decreasing risks through preventive measures, timely identification of irregularities, limitation of losses and timely restoration. In addition, management should ensure that this policy

AUDIT RESULTS AND AUDITEE RESPONSES (CONTINUED)

specifies the purpose and objectives, the management structure, the scope within the organization, the assignment of responsibilities for implementation and the definition of penalties and disciplinary actions associated with failing to comply with security and internal control policies.

Recommendation: Management at Montgomery CC need to work with NCCCS to develop and adopt a set of formal standards to ensure that all critical general security issues are addressed in their policies and procedures. In addition, they should have a mechanism in place to periodically review standards for any new critical areas that should be addressed and include policies and procedures regarding these areas in Montgomery's security policies.

Auditee's Response: Montgomery CC will develop a set of policies and procedures regarding the monitoring of critical operating systems, servers, and how to respond to security threats.

The College will include a statement in the "New Employee Orientation" checklist to ensure that the individual employee understands and acknowledges the existing security and computer usage policies in the Board Policy Manual.

Montgomery CC will consult with the North Carolina Community College System to provide MCC with necessary configuration to the system.

Montgomery CC will develop a risk assessment methodology to determine the critical areas or operations of the College to allow management to prioritize resources.

ACCESS CONTROLS

The access control environment consists of access control software and information security policies and procedures. An individual or a group with responsibility for security administration should develop information security policies, perform account administration functions and establish procedures to monitor and report any security violations. We reviewed the access controls for Montgomery Community College's critical operating systems. We found several significant weaknesses in access controls. Due to the sensitive nature of the conditions found, we have conveyed these findings to management in a separate letter pursuant to the provision of *North Carolina General Statute 147-64.6(c)(18)*.

PROGRAM MAINTENANCE

Program maintenance consists of making changes to existing application systems. Programmers should follow program change procedures to ensure that changes are authorized, made according to specifications, properly tested, and thoroughly documented. Application programmers should be restricted to a test environment to ensure that all changes to production resources are tested and approved before moving the changes into production. Changes to application system production programs should be logged and monitored by management. Because the same procedures are used to patch and upgrade the critical

AUDIT RESULTS AND AUDITEE RESPONSES (CONTINUED)

application and the operating system, we indirectly tested program changes to the critical application in our test of system software maintenance.

SYSTEMS SOFTWARE

Systems software is the collection of programs that the computer center uses to run the computer and support the application systems. This software includes the operating system, utility programs, compilers, database management systems and other programs. The systems programmers have responsibility for the installation and testing of upgrades to the system software when received. We found a significant weakness in systems software maintenance. Due to the sensitive nature of the condition found, we have conveyed this finding to management in a separate letter pursuant to the provision of *North Carolina General Statute 147-64.6(c)(18)*.

PHYSICAL SECURITY

Controls over physical security are designed to protect a computer center from service interruptions resulting from fire, water, electrical problems, vandalism, and other causes.

AUDIT FINDING 2: PHYSICAL SECURITY OF THE COMPUTER PROCESSING FACILITY

The computer room is not reasonably secure from foreseeable and preventable threats to its physical continuity. We found the following physical security weaknesses:

- Montgomery CC's computer room is not equipped with smoke detectors, automated fire suppression system, or hand-pulled fire alarms. Therefore, Montgomery CC is not protected from an environmental hazard, such as, fire. Also, the computer room is not equipped with alarms to notify appropriate personnel of environmental hazards , such as fire, water etc.

Management should also assure that sufficient measures are put in place and maintained for protection against environmental factors (e.g. fire, dust, power, excessive heat and humidity).

Recommendation: Montgomery CC should develop procedures to ensure that the computer room is equipped with smoke detectors and alarms to notify personnel of environmental hazards.

Auditee's Response: We have placed a smoke detector in the return air duct that is located directly above the computer room. This smoke detector will notify appropriate monitoring services and initiate the alarm system in the event of fire. In addition, we have installed a hand-pulled fire alarm located behind the door of the computer room.

AUDIT RESULTS AND AUDITEE RESPONSES (CONCLUDED)

DISASTER RECOVERY

Disasters such as fire and flood can destroy a computer service center and leave its users without computer processing support. Without computer processing, many College services would grind to a halt. To reduce this risk, computer service centers develop disaster recovery plans. Disaster recovery procedures should be tested periodically to ensure the recoverability of the data center. Our audit identified one significant weakness in the disaster recovery planning.

AUDIT FINDING 3: RESUMPTION OF COMPUTER SYSTEMS

Montgomery CC has a disaster recovery plan to ensure the resumption of computer systems during adverse circumstances. However, the disaster recovery plan is incomplete and has not been tested. The plan does not include the following critical components:

- Executive management's signature of approval of the plan.
- Alternate user department procedures to manage their workloads until processing resumes.
- A procedure to update the plan when there are major changes to the environment or at least annually.

In the event of a disaster, the aforementioned components are necessary to ensure the proper recovery of the computer resources. Also, a disaster recovery plan should be tested to ensure that the plan is effective. Management should ensure that a written plan is developed and maintained in accordance with the overall framework for restoring critical information services in the event of a major failure. The disaster recovery plan should minimize the effect of disruptions. Procedures should require that the plan be reviewed and revised annually or when significant changes to the college's operations occur.

Recommendation: Montgomery CC should include all the aforementioned critical components in their plan and should test the plan at least on a yearly basis.

Auditee's Response: Montgomery CC will update the disaster recovery plan to include the College's executive management's signature, to include alternate user department procedure workloads and a procedure to update and test the plan annually.

DISTRIBUTION OF AUDIT REPORT

In accordance with General Statutes 147-64.5 and 147-64.6(c)(14), copies of this report have been distributed to the public officials listed below. Additional copies are provided to other legislators, state officials, the press, and the general public upon request.

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