



STATE OF NORTH CAROLINA

AUDIT OF THE INFORMATION SYSTEM GENERAL CONTROLS

AT

DURHAM TECHNICAL COMMUNITY COLLEGE

DURHAM, NORTH CAROLINA

JUNE 2004

OFFICE OF THE STATE AUDITOR

RALPH CAMPBELL, JR.

STATE AUDITOR

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Ralph Campbell, Jr.
State Auditor

STATE OF NORTH CAROLINA
Office of the State Auditor

2 S. Salisbury Street
20601 Mail Service Center
Raleigh, NC 27699-0601
Telephone: (919) 807-7500
Fax: (919) 807-7647
Internet <http://www.osa.state.nc.us>

AUDITOR'S TRANSMITTAL

The Honorable Michael F. Easley, Governor
Members of the North Carolina General Assembly
The Board of Directors of Durham Technical Community College
Dr. Phail Wynn, Jr., President

Ladies and Gentlemen:

We have completed our information systems (IS) audit of Durham Technical 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 Durham Technical 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 Durham Technical Community College has performed satisfactorily and where improvements should be made.

We wish to express our appreciation to the staff at Durham Technical 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.'.

Ralph Campbell, Jr.
State Auditor

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EXECUTIVE SUMMARY

We conducted an information system (IS) audit at Durham Technical 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 Durham Technical 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 Durham Technical 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. Durham Technical Community College computer center is secure from foreseeable and preventable security and environmental threats. *We did not detect a significant weakness in physical security.*

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. Durham Technical Community College does not have a written Disaster Recovery Plan. *See Audit Finding 2, 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 Durham Technical 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 Durham Technical 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

Durham Technical Community College, located in Durham, NC, opened its doors September 5, 1961. The Southern Association of Colleges and Schools accredits Durham Technical Community College to award associate degrees. The educational opportunities range from instruction in basic literacy skills to college-level courses, including general education and occupational, technical, and university transfer programs. These opportunities are available to all adults who wish to learn and who can profit from instruction provided.

The IT division at Durham Technical Community College is referred to as the Information Technology Services Department (ITSD). ITSD is responsible for serving the College's technology needs in the administrative and academic areas. The director of ITSD heads this department and reports to the Vice-President for Student Support Services. Information Technology Services is responsible for the maintenance and operation of computer resources including e-mail, campus networking, the academic computer labs, and the administrative computer system. The department is also responsible for installing and maintaining the campus network, which at present connects ten buildings on the main campus and the satellite campuses at Northern Durham and Chapel Hill. Installation, software, and hardware maintenance of all academic computer labs, including approximately 1,000 PCs, is a chief responsibility of the ITSD staff.

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AUDIT RESULTS AND AUDITEE RESPONSES

The following audit results reflect the areas where Durham Technical 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 Durham Technical 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:

- Durham Technical CC has no written standards or policies and procedures regarding, super user access, the monitoring of critical operating systems and servers, how to respond to security threats, and how users should securely use the networks. Without adding these critical components to a security program, management has not appropriately communicated to the Durham Technical CC staff its overall approach to security and internal control in these aforementioned critical areas.
- NCCCS has not provided Durham Technical CC with a baseline configuration for securing the critical operating system. The critical operating systems may not be secure from commonly known vulnerabilities.
- Durham Technical 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 Durham Technical 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 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.

AUDIT RESULTS AND AUDITEE RESPONSES (CONTINUED)

Recommendation: Management at Durham Technical 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. Also, 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 Durham Technical's security policies.

Auditee's Response: Durham Technical Community College's System Administrator has volunteered to work with a committee consisting of System administrators from several other community colleges, personnel from the North Carolina Community College System Office, and IIPS organization members. This committee will create a formal set of standards for all community colleges that will include a secure baseline Unix configuration, a set of policies and procedures for access control, and a way to implement a policy that will perform periodic reviews of these standards. In addition, Durham Technical Community College staff will explore ways to set configurations, secure access files, and set up logging to run critical applications in an environment that will minimize data loss and unauthorized access.

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

AUDIT RESULTS AND AUDITEE RESPONSES (CONTINUED)

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. Durham Technical Community College computer center is secure from foreseeable and preventable security and environmental threats. *We did not detect a significant weakness in physical security.*

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 disaster recovery.

AUDIT FINDING 2: RESUMPTION OF COMPUTER SYSTEMS

Durham CC does not have a written disaster recovery plan to ensure the resumption of computer systems during adverse circumstances. In the event of a disaster, there is no plan in place to determine how the computer systems will be restored. Durham CC would not be able to process financial transactions or student record information. 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.

Recommendation: Durham CC should develop a disaster recovery plan and test it on a yearly basis.

Auditee's Response: The Information Technology Services Department of Durham Technical Community College has a disaster recovery plan that has proven successful during several different types of disaster recoveries. However, we do not have a formal written plan for all units of the College. Durham Tech's ITSD is in the process of reviewing several

AUDIT RESULTS AND AUDITEE RESPONSES (CONCLUDED)

effective disaster recovery plans from other colleges and universities. The resulting written plan will be a comprehensive procedure for addressing specific way the College will handle restoring critical information services should a disaster occur. During the course of any given year Durham Tech will test, at least annually, the effectiveness of data and service restoration using the elements of this plan.

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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Dr. Phail Wynn, Jr.	President, Durham Technical Community College

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Office of the State Auditor
State of North Carolina
2 South Salisbury Street
20601 Mail Service Center
Raleigh, North Carolina 27699-0601

Internet: <http://www.ncauditor.net>

Telephone: 919/807-7500

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