



# STATE OF NORTH CAROLINA

**AUDIT OF THE INFORMATION SYSTEM GENERAL CONTROLS**

**AT**

**PIEDMONT COMMUNITY COLLEGE**

**ROXBORO, 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**

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The Honorable Michael F. Easley, Governor  
Members of the North Carolina General Assembly  
The Board of Directors of Piedmont Community College  
Dr. H. James Owen, President

Ladies and Gentlemen:

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

We wish to express our appreciation to the staff at Piedmont 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 cursive script that reads 'Ralph Campbell, Jr.'.

Ralph Campbell, Jr.  
State Auditor

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## EXECUTIVE SUMMARY

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We conducted an information system (IS) audit at Piedmont 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 Piedmont 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 Piedmont 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. Piedmont 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. Piedmont Community College has a Disaster Recovery Plan, however, the plan has not been tested. *See Audit Finding 3, Disaster Recovery Plan Test.*

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## AUDIT OBJECTIVES, SCOPE, AND METHODOLOGY

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### 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 Piedmont 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 Piedmont 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.<sup>1</sup>

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<sup>1</sup> 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**

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Piedmont Community College is a public two-year institution that provides diverse educational opportunities in a learner-centered environment. Piedmont Community College, located in Roxboro, North Carolina was founded in 1970. The Southern Association of Colleges and Schools accredits Piedmont Community College to award Adult Basic Skills (GED), Associate Degree Programs, Diploma, and Certificate Programs. The College offers both curriculum classes and continuing education classes. The mission of Piedmont Community College is to serve the citizens of Person and Caswell Counties by improving quality of life and acting as a catalyst for economic development.

The IT division at Piedmont Community College is referred to as the Administrative Computing Services division of the College. The Director of Management Information Services, who is responsible for the entire computing of Piedmont Community College, heads the Administrative Computing Services division. This position reports to the Vice President of Administrative Services. The mission of the Administrative Computing Services division is to insure the integrity of the administrative systems and infrastructure. The function of the Administrative Computing Services division is to provide installation, upgrade and support services for the administrative systems of the College and to develop, maintain, and upgrade the College information infrastructure in support of expanding technology goals.

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## **AUDIT RESULTS AND AUDITEE RESPONSES**

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The following audit results reflect the areas where Piedmont 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 Piedmont 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:

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

*Recommendation:* Management at Piedmont 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

## **AUDIT RESULTS AND AUDITEE RESPONSES (CONCLUDED)**

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place to periodically review standards for any new critical areas that should be addressed and include policies and procedures regarding these areas in Piedmont's security policies.

*Auditee's Response:* Piedmont Community College will work with NCCCS to develop and adopt a set of formal baseline standards to ensure that all critical general security issues are addressed.

Piedmont Community College IT staff will develop internal written policies and procedures for the organization detailing proactive and reactive responses to overall systems security (by the end of 2004).

Piedmont Community College's annual risk assessment is currently in a state of transition. In 2002-2003 critical financial operations were moving to CIS from the NCCCSIIPS (legacy) system. As experience is gained in this new system, Piedmont Community College will conduct risk assessment on critical operations. Piedmont Community College is scheduled to complete migration to CIS in 2006-2007. OSA offered to assist in this process by providing information of IT Risk Assessment.

### **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 Piedmont 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 (CONCLUDED)

### 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:

- Access to the offsite storage area and the computer area are not restricted to authorized personnel. As a result, the physical security over Piedmont back-up tapes and computing resources is weakened and could allow unauthorized tampering of the data stored on the back-up tapes and unauthorized access to computer hardware.

Appropriate physical security and access control measures should be established for computer processing facilities in conformance with the general security policy. Access should be restricted to individuals who have been authorized to gain such access.

*Recommendation:* Piedmont CC should develop procedures to ensure that the computer room and offsite storage areas are always secure from unauthorized personnel.

*Auditee's Response:* Piedmont Community College does restrict access to the computing facility to those who have a need for access. The off-site storage room is also secured when not in use by appropriate computing support personnel. Piedmont Community College will arrange for a locked file cabinet to further secure backup media. Piedmont Community College will develop a written (policy and/or) procedure addressing security and access to backup media and the computing facility.

Piedmont Community College has removed the world write access from backup drives on the critical system to prevent unauthorized users from accessing the media while in the drive.

## AUDIT RESULTS AND AUDITEE RESPONSES (CONCLUDED)

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### 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: DISASTER RECOVERY PLAN TEST***

Piedmont CC has a disaster recovery plan to ensure the resumption of computer systems during adverse circumstances. However, the disaster recovery plan has not been tested. A disaster recovery plan should be tested to ensure that the plan is effective.

*Recommendation:* Piedmont CC should test the plan at least on a yearly basis.

*Auditee's Response:* Piedmont Community College relies on NCCCS as a disaster recovery site. Piedmont Community College will negotiate with NCCCS to go to Raleigh to test the ability to operationally recover during an adverse circumstance.

Backup tapes are read periodically to insure recovery efficacy of data and systems.

## DISTRIBUTION OF AUDIT REPORT

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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.

### EXECUTIVE BRANCH

The Honorable Michael F. Easley	Governor of North Carolina
The Honorable Beverly M. Perdue	Lieutenant Governor of North Carolina
The Honorable Richard H. Moore	State Treasurer
The Honorable Roy A. Cooper, III	Attorney General
Mr. David T. McCoy	State Budget Officer
Mr. Robert L. Powell	State Controller
Mr. Martin Lancaster	President
	The North Carolina Community College System
Dr. H. James Owen	President, Piedmont Community College

### LEGISLATIVE BRANCH

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### Other Legislative Officials

Mr. James D. Johnson	Director, Fiscal Research Division
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### Other Officials

Chairman and Members of the Information Resource Management Commission

## ORDERING INFORMATION

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Copies of this report may be obtained by contacting the:

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