STATE OF NORTH CAROLINA

AUDIT OF THE INFORMATION SYSTEM GENERAL CONTROLS

AT

HAYWOOD COMMUNITY COLLEGE

CLYDE, NORTH CAROLINA

JUNE 2004

OFFICE OF THE STATE AUDITOR

RALPH CAMPBELL, JR.

STATE AUDITOR

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Office of the 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 Haywood Community College
Dr. Nathan L. Hodges, President

Ladies and Gentlemen:

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

We wish to express our appreciation to the staff at Haywood 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,

Ralph Campbell, Jr.
State Auditor

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EXECUTIVE SUMMARY

We conducted an information system (IS) audit at Haywood 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 Haywood 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 Haywood 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. Haywood Community College computer center is secure from foreseeable and preventable security and environmental threats. *We found no significant weaknesses 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. Haywood Community College has a disaster Recovery Plan, however, the plan is inadequate and has not been tested. *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 Haywood 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 Haywood 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

Haywood Community College is an "open door" community college serving the residents of eligible age in Haywood County and surrounding areas. Haywood Community College was established in 1965 and is located at 185 Freedlander Drive, Clyde, NC. The Southern Association of Colleges and Schools accredits Haywood Community College to award associate degrees, diplomas, and certificates. The College offers education and training in the following areas: Business and Entrepreneurship, Natural Resources, Applied Technology, Engineering, Information Systems, and Liberal Arts. The mission of Haywood Community College is to offer accessible educational, social, and cultural opportunities to residents of Haywood County and the surrounding area. Through its open-door policy, the College strives to meet the needs of students with varying backgrounds, resources, interests, abilities, and career goals.

The Information Technology (IT) division at Haywood Community College is composed of a Director of Technology, a Network Administrator, a Unix System Administrator and a part-time programmer that support the functions of the IT division. The Director of Technology reports to the Dean of Administrative Services. The mission of the IT division is to provide Haywood Community College customers with the highest quality information services possible in a cost-effective, timely and customer-oriented fashion. The function of the IT division is to provide administrative and academic computing services to faculty, staff, and students at Haywood Community College.

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AUDIT RESULTS AND AUDITEE RESPONSES

The following audit results reflect the areas where Haywood 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 Haywood 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:

- Haywood CC has no written standards or policies and procedures regarding the monitoring of critical operating systems and servers, how to respond to security threats, group assignments and re-assignments, new account procedures, super user access, and how users should securely use the networks. Also, 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 Haywood CC staff its overall approach to security and internal control in these aforementioned critical areas.
- NCCCS has not provided Haywood CC with a baseline configuration for securing the critical operating system. The critical operating systems may not be secure from commonly known vulnerabilities.
- Haywood 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 Haywood 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 Haywood 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 Haywood's security policies.

Auditee's Response: Concur: Haywood Community College will work with the North Community College System to develop policies and procedures for ensuring that all critical general security issues are addressed. These formal standards will be reviewed periodically, no less than once per year, to address and include policies and procedures regarding any new critical areas. Haywood Community College will work with the North Carolina Community College System to develop a framework policy, which establishes Haywood Community College's approach to security and internal control. The framework policy will be implemented though the use of IT Security Awareness Training. All employees, current and new will be required to undergo the training, which will be conducted on Black Board and documented. This training system is currently being developed.

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 Haywood 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.

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. Haywood Community College computer center is secure from foreseeable and preventable security and environmental threats. *We found no significant weaknesses 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 the disaster recovery planning.

AUDIT FINDING 2: RESUMPTION OF COMPUTER SYSTEMS

Haywood 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:

- Identification of key personnel and their assignments during the restoration of processing.
- 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: Haywood 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: Concur: The key personnel responsible for restoring data processing in the event of a disaster are Bruce Denton, the system administrator and Peter Stanley, the back up system administrator. Department heads will be required to create and document alternate procedures for managing workloads during expected and unexpected downtime. Computer system recovery procedures will be reviewed and updated on a yearly basis.

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. Nathan L. Hodges	President, Haywood Community College

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