

Clemson University

Environmental Audit

**Executive Summary
May 2006**





Clemson University

Environmental Audit

**Executive Summary
May 2006**

AUDIT COMMITTEE CHAIRMAN

Alan W. Elzerman
Environmental Engineering and Science
School of the Environment

SENIOR RESEARCH ASSOCIATE

Donna S. London
Jim Self Center on the Future
Strom Thurmond Institute

ENVIRONMENTAL AUDIT COORDINATOR

Ryan M. Perkl
Graduate Student
Planning and Landscape Architecture

SPONSORED BY:

SC Sustainable Universities Initiative
And
Clemson University Environmental Committee

Clemson University
Silas Pearman Boulevard
Clemson, SC 29634-0125 USA

Support for this project was provided by the SC Sustainable Universities Initiative (SC SUI). For additional information about SC SUI see: <http://www.sc.edu/sustainableu>.



April 20, 2006

Dear Clemson University Faculty, Staff, and Students:

Over the past five years, environmental issues have been on the forefront of many of Clemson University's activities. President Jim Barker and the Sustainable Universities Initiative have been catalysts in these efforts. In January 2002, the Clemson University Environmental Committee was officially formed. Appointments to the Committee were made from each of the five colleges and all of the university's operational areas. Given the breadth of the membership and the general desire to fully understand the nature and impacts of particular situations, the committee represents a balanced and thoughtful perspective. From that standpoint as well as the support of the university president and leadership, CUEC has gained respect across the campus. As a first order of business the Committee developed a mission statement:

To further an environmental agenda for the Clemson University campus by seeking ways to minimize needless consumption of material and energy, coordinating information, education, and research related to the campus environment, and to establish Clemson University as a national leader in incorporating environmental principles into campus operations and design.

Putting this mission to action, the Committee with the support of the SC Sustainable Universities Initiative embarked on an ambitious campus environmental audit. With a campus employee and student population of approximately 27,000, we collectively consume considerable energy, water, and material resources resulting in effects on the environment. We are committed to responsible use of environmental and financial resources and investigation of ways we can make our activities more compatible with sound environmental management and stewardship.

Environmental awareness is not new to campus but this audit provides a basis for asking more of the right questions, seeking the relevant information and implementing the appropriate programs. It has been conducted with the expectation that this will be the first step in a continuous self examination process.

Conducted by over 70 students, the audit is a clear sign of the university's commitment to enhancing the environmental performance of the Clemson University community. The administration, staff, faculty, students, and the Clemson University Environmental Committee have dedicated precious time and effort to this report. The openness and common vision of the staff that provided and explained the information were crucial to the audit's development.

By necessity and design, this audit is not totally comprehensive. While the authors and reviewers have checked and double checked the material, we expect there may be a few discrepancies. We further expect that over time conditions will change and new information may become available. We would appreciate your bringing this information to our attention. Finally, statements and recommendations come from the authors and the participants and should not be construed to represent official University policy.

If you have comments, suggestions, requests or information to add, please contact me. This process has been rewarding and valuable. We are encouraged by this initial effort and hope that this process will provide some answers, raise some questions, and continue to serve our Clemson University community.

Sincerely,
Alan W. Elzerman, Ph.D.
Professor and Principal Investigator, SC SUI



April 20, 2006

Clemson University Community:

As the immediate past chair of the Clemson University Environmental Committee (CUEC), it is my pleasure to represent the CUEC in support of the Campus-Wide Environmental Audit. This effort, which was spearheaded by a graduate student, Mr. Ryan Perkl, provides an excellent framework or report card for our local campus environment. Clearly, our campus environment is an awesome resource that we should appreciate and manage wisely. As a direct result of this project, we know the current status of our local environment. From this, we can prioritize our efforts and focus on those areas needing immediate and future attention where intervention can mitigate potential risks and conserve our limited resources more wisely.

This project was strongly supported by the CUEC and many of the CUEC members actively participated in providing data and review of the information contained in the Environmental Audit. Indeed, the CUEC chose to support this activity as a “legacy” project that emphasizes our intent to “walk the walk” of a sustainable campus. We set as a goal, leaving Clemson University a better place than we found it when we arrived. This project represents an essential initial effort toward accomplishing that goal.

Thank you for the opportunity to present this report. We appreciate the efforts of all who were involved in its production.

Sincerely,

John H. Rodgers, Jr., Ph.D.
Professor, Department of Forestry and Natural Resources
Past Chair, Clemson University Environmental Committee (2004-2005)

**Clemson University
Environmental Committee****Resolution No. 06-0002**

A RESOLUTION TO SUPPORT THE ENDORSEMENT OF THE CLEMSON UNIVERSITY ENVIRONMENTAL AUDIT IN PRINCIPLE AND AS AN EDUCATIONAL DOCUMENT FOR DISSEMINATING INFORMATION.

WHEREAS, Clemson University has embarked on an ambitious initiative to establish Clemson University as a leading national and international sustainable campus; and

WHEREAS, the university embraced the efforts of the Sustainable Universities Initiative which fundamentally supports the principles of sustainable operations and development; and

WHEREAS, the university endorsed a preliminary environmental audit in 1992 which established the rationale for continual assessment of Clemson University's impacts on the environment; and

WHEREAS, the university is committed to incorporating and fostering collaborative research opportunities whenever possible as a means of better educating university faculty, staff, and students in an effort cultivate a more sustainable learning environment; and

WHEREAS, this focus is consistent with the university's vision to be a top 20 public university and with the university's Sustainable Environment academic emphasis area;

NOW, THEREFORE, BE IT RESOLVED, that the Clemson University Environmental Committee supports and endorses the university wide environmental audit as an evaluative educational tool to be used in assessing the university's overall environmental performance. The university wide environmental audit is to serve as a baseline model for the continuation of such voluntary and internal evaluation processes while the university continues to evaluate the possible benefits to be accrued from implementing an Environmental Management System (EMS). The committee also wishes to extend its sincere thanks to Ryan Perkl, project information sources, supporters, and the students involved in this collaborative inquiry.

DULY RESOLVED AND APPROVED by the Clemson University Environmental Committee this 20th day of April, 2006.

B. Allen Dunn, Chairman
Clemson University Environmental Committee

Attest:

Donna S. London
Sustainable Universities Initiative, Clemson University

Acknowledgments & Participants

The audit's content is based on the contributions of numerous employees and students from across the university campus. Sincere thanks and appreciation are extended to them. The people participating on both sides of the inquiry process were critical in making this report possible. In addition to the list below, specific contributors are listed at the beginning of the sections to which they contributed.

Larry Addis	William Daniel	Robin Newberry
Andy Anderson	Alan Elzerman	Ryan Perkl
Jim Boleman	Adrienne Gerus	J. Powel Smith
June Brock	Jeffrey Hinson	David Raiger
Charles Butts	Trish Jerman	Gerald Vander May
Phillip Carol	Donna London	Teresa Dunn Vosburgh
Jim Castle	Marshall Lounsberry	John Walke
Jay Chapin	Robert McCrary Jr.	Bob Wells
James Clark Jr.		C. Don Worthy

In addition to the individuals noted above, several university groups were crucial allies and participants in this environmental audit. Special thanks are due to the sponsors of this audit - the SC Sustainable Universities Initiative (SUI) for funding the project and the Strom Thurmond Institute and the Clemson University Environmental Committee (CUEC) for their endorsement and support.

Clemson University Environmental Committee 2005-06

Andy Anderson – Recycling Coordinator
 James M. Boleman – Procurement Services
 Bill Bowerman – Faculty Senate
 Stacy Brogan – Students for Environmental Awareness
 Bill Daniel – Municipal Services
 Bryan Leigh – Clemson University Student Government
 Donna London – Sustainable Universities Initiative
 Beth Jarrard – Public Affairs
 Rose Marie McDonald – Air & Water Quality Committee
 W. Robert Newberry – Environmental Health & Safety
 Allen Dunn – Public Service & Agriculture
 Arvind Pasula – Graduate Student Government
 Alan Elzerman – College of Engineering & Sciences
 David Raiger - ARAMARK
 Gary Gaulin – University Housing
 John Rodgers – Clemson Environmental Institute
 Jim London – College of Architecture, Arts & Humanities
 Bob Wells – Facilities
 Rockie English – College of Agriculture, Forestry & Life Sciences
 Chris Sober – Classified Staff Senate
 Elizabeth Edmondson – College of Health, Education & Human Development

Introduction

Clemson University faces the challenge of meeting its core mission while participating responsibly in its community and in society as a whole. At the same time, the university has made a commitment to being a positive and creative leader in the protection and enhancement of the local and global environment through its teaching, research, public service, and administrative/support operations. Clemson University recognizes the importance of environmentally responsible practices in managing the natural resources under its care. One such practice includes voluntary, internal auditing across a broad and extensive array of university operations.

Environmental Auditing (EA) is a systematic, documented, and objective assessment of an organization's activities and operations. A proactive process, the assessment allows the university to ask more meaningful questions and to acquire relevant information. Audits generally address compliance with relevant statutory and internal requirements, facilitate management of environmental practices, promote good environmental management, maintain credibility with the public, raise internal awareness and enforce commitment to departmental environmental policy, exploration of opportunities for improvement, and performance baselines for future development of an Environmental Management System (EMS).

As Clemson moves closer to its vision of a top twenty public university and a sustainable campus, Clemson faculty, staff, and students corporately and individually have a responsibility to keep the audit process alive. Understandably this effort underscores operational areas in need of improvement but it also generates positive information and opens new opportunities for intellectual study. The inherent spirit of openness in the audit process provides the focus that is necessary for long term beneficial change and greater potential for Clemson's attainment as a state and national sustainable campus leader.

Audit Process

In 1992 Clemson produced an environmental audit report that evaluated various areas of campus operations. The audit process was dormant for over a decade but was revived in November 2004 by the Sustainable Universities Initiative researchers, Clemson's University Environmental Committee, and past contributors' to the earlier audit. Clemson President James F. Barker supported these efforts and asked for the cooperation of university faculty and staff.

A masters level planning student was hired to coordinate the effort and the Clemson University Client Based Technical Writing Program was contracted to collect data. Under the direction of their faculty member and the audit coordinator, approximately seventy undergraduate writing students assisted with the development of the query tools and the actual interviews.

The process was designed to gather consistent data that could be compared over time. Questionnaires were circulated to the operational areas under review. After review of the responses, the students then met with the respondents for further information and clarification. This information was further developed, edited and formatted for consistency. CUEC members along with other volunteers reviewed the results.

During this time, the project coordinator along with the information sources reviewed and discussed concerns and editing issues to ensure accuracy. After the audit was finalized it was presented at the final 2005/2006 CUEC meeting wherein CUEC approved the audit and support for a continuous audit process.

While this phase of the audit has been finalized, it should not be viewed as a static effort. It has been developed with an ongoing process in mind. While the university has made numerous strides in the direction of sustainability, much work is still needed. Activities need to be reviewed over time as conditions may change. Additionally, other opportunities for improvement need to be explored. We are pleased to offer the 2006 Clemson University Environmental Audit and hope that it will be useful to our constituents but also to other university communities seeking to embark on similar endeavors.

Summary of Audit Components

Energy Use:

Clemson University's total energy consumption for 2003 was comprised of the following: electricity, 50.9% of total use or 136,087,715 kWh purchased for a cost of \$4,566,581, coal, 34.5% of total use or 11,647 tons purchased for a cost of \$658,061, natural gas, 13.8% of total use or 121,885 Million Cubic Feet (MCF) purchased for a cost of \$775,887, fuel oil, 0.6% of total use or 215,766 gallons purchased for a cost of \$33,555, and propane, 0.2% of total use or 22,080 gallons purchased for a cost of \$27,245. The total cost of energy expenditures for 2003 was \$6,061,329. The total budget allotted for University Facilities is approximately \$10,000,000 annually.

Electric consumption in 1990/91 was 110,669,000 kWh at a cost of \$0.042 per kWh. Conversely, electric consumption in 2002/03 was 123,044,000 kWh at a cost of \$0.032 per kWh. During this time, Clemson's consumption of electricity increased by 11,663,000 kWh or 10.47%, which, in turn breaks down to Clemson University and its students using 6.53% and 3.94% more electricity today than they did in 1994 respectively. The cost of electricity has declined by 22.39% and Clemson's total electrical cost has declined by 14.27% since 1994. An additional savings of approximately 8.12% could have been realized if consumption had remained constant.

The electricity is purchased from Duke Power. Their energy generation portfolio is approximately 45% coal, 40% nuclear, 5% gas turbine and hydroelectric and 10% other.

August marks the month with the highest average electrical consumption, 11,953,000 kWh. February marks the month with the lowest average electrical consumption, 8,628,000 kWh.

Clemson has 3 options for steam generation (coal, #2 oil, and natural gas). The most economical at a particular point in time is used. Coal consumption in 1990/91 was 15,334 at a cost of \$49.47 per ton. Coal consumption in 2002/03 was 11,647 at a cost of \$60.00 per ton. Approximately 20% (mass) of the coal is left over as ash and is disposed of in a regional landfill.

Estimated steam usage allocation by use is as follows: space heating 65%, hot water 20%, dehumidification 10%, humidification 3%, process 2%. The CEF operates at slightly over 50% capacity during its peak winter load. It is approximated that \$1.75 million in renovations will be necessary by 2007 in order to comply with the Boiler MACT rules which require new EPA emission standards.

The Central Energy Facility (CEF) and East Campus Chilled Water Plant are the two chiller plants of Clemson. All central chillers are connected to the chilled water continuous loop for providing cooling needs to campus buildings. Refrigerants are used in University chillers at Calhoun Courts only and these remaining Chloro-Flouro Carbons

(CFC's) are slated to be phased out by 2007. CEF Chillers obtain condenser water from Lake Hartwell at 55 to 84 degrees and is permitted to discharge temperatures of 90 degrees during the winter and 100 degrees during the summer. CEF Chillers circulate between 0 and 10,000 gallons per minute based on cooling demand. In 1999 and 2000 the CEF underwent \$13.5 million in renovations which has translated into approximately 40% increase in chiller plant efficiency. Ad hoc benchmarking indicates Clemson utilizes approximately 30% less chiller capacity than does its peers.

Hazardous Waste:

Clemson's total hazardous waste (HW) composition is made up of approximately 1,300 individual waste streams. The top two producers of HW are the chemistry and agronomy bio-engineering department. As such, Clemson produces four times as much hazardous waste as it did in 1992, up from approximately 1,000 pounds to 4,000 pounds. The cost of disposing of hazardous waste however has decreased by 25% during this same time period, down from \$126,666 to approximately \$100,000.

It appears that staff and student training on proper use of hazardous materials is the most effective way to reduce waste in a university setting. Microscaling, an effort to conduct smaller scale experiments, is continuing in Clemson Laboratories but ceases to impact HW reduction.

Any hazardous waste found on Clemson property is Clemson's responsibility and all wastes are either classified as Resource Conservation and Recovery Act (RCRA) or non-RCRA wastes. The term "Household wastes" is obsolete. All recyclable materials are recycled regardless of cost.

Medical Waste:

Clemson University spends approximately \$5,000 annually to dispose of medical waste generated on campus. In 2003 the cost for the disposal of medical waste was \$4440.50. Medical waste that is produced on campus is disposed of bi-monthly and the amount of medical waste collected during a two-week span is 400-500 pounds. The current method of waste disposal here at Clemson is by incineration. This contract is placed out for bid annually and is currently being sent to Medical Waste Systems of Florence, SC. This has been the case for the last two years. Approximately 25% of medical waste at Clemson is potentially harmful to a person's health.

Outdoor Air Quality:

In 2003 Clemson Energy Facility emitted 86.70% less nitrogen oxides, and 73.44% less particulate matter than it did in 1992. The Clemson University Central Energy Facility generated the following yearly averages between April 2001 and March 2004: 36.510

tons of particulate matter, 84.927 tons of nitrogen oxides 177.746 tons of sulfur dioxide
39.825 tons of carbon monoxide 1.592 tons of volatile organic compounds

Pesticides & Grounds Management:

While Clemson University's use of pesticides is arguably essential to provide a beautiful environment for its campus community, the introduction of any synthetic substance (pesticides) adversely affects the environment to some degree. Clemson University Facilities and Landscape Services annually spends about \$6,000 on all pesticides, mostly for sidewalk ice melting compounds and Round Up (an herbicide) to remove weeds from mulched areas and in flower and shrub beds on campus.

Over the last five years, Clemson has purchased over 80% of its total chemical stock; this material is stored in the lumber yard storage facility. Disposing of excess chemicals costs an average of \$0.75 per pound and is carried out via incineration. Whenever feasible, Clemson University Departments on and off campus utilize integrated pest management (IPM) to minimize pesticides' effects on the environment.

Procurement Policy:

Clemson does not currently have a mandated policy to purchase environmentally friendly products. Furthermore, Clemson purchases an estimated 28,000 reams of office paper a year this paper has a 30% post-consumer waste content. It is estimated that 5% individual departmental purchases include recycled products. This is due in part to the constraints established by the state procurement policies.

ARAMARK's Java City Coffee shop has a reusable mug program to cut down on paper waste and they report that it "continues to promote awareness of consumption and food waste in dining halls." An estimated 191 tons of cardboard and 4,187 gallons of cooking oil have been captured for recycling by ARAMARK annually.

Radioactive Waste:

In 1992 there were 45 separate licenses issued to individual University departments. At that time, each license cost approximately \$75 and Clemson budgeted a total of \$40,000 annually for licensure and disposal activities. Today, Clemson possesses two licenses for the use of radioactive materials; License 482 pertains to the Environmental Technologies Lab and License 540 pertains to the Rich Lab, ENTOX, the main campus, and select statewide research and education centers. Each license is valid for a period of five years and carries with it a cost of \$4,500 a year per license.

Clemson University has had a number of small spills that resulted in local area contamination from aqueous radionuclides. Appropriate safety mechanisms ensured that

cleanup occurred quickly, and all incidents were decontaminated to below clean area limits with acceptable turn around times. Radioactive materials not in active use by Clemson researchers are stored securely. These materials are stored at the Radiation Safety Facility.

Clemson University has licenses for phosphorous-32, phosphorous-31, carbon-14, and hydrogen-3 which account for the majority of Clemson's radioactive usage. Clemson is also licensed to use other radioactive materials but in much smaller quantities, these may include but are not limited to: nickel-63, cesium-137, uranium-234, plutonium-240, and neptunium-237.

Clemson generates approximately 150-200 ft³ of non-compacted, short-lived, dry-active waste annually. Approximately 75-150 ft³ of compacted, long-lived, dry active waste is disposed of yearly at Clemson. A 10-25% volume reduction is obtained when radioactive waste personnel compact these wastes. Nearly 2,000 gallons of liquid radioactive waste is disposed of yearly. Non-organic waste comprises about 1,000 gallons. More specifically, liquid scintillation and organic waste comprise nearly 800 gallons of the liquid radioactive waste disposed of at Clemson each year. The disposal of long-lived solid waste carries with it a cost to Clemson of approximately \$40,000 annually. Typically, long-lived liquid waste disposal fees for Clemson range from \$10 to \$100 per gallon.

Recycling:

Clemson University has budget of \$200,000 per year for recycling. Administrators estimate that Clemson has approximately 1,000 recycling bins of various sizes on campus.

Construction and demolition produce the highest percentage of total waste tonnage recycled at Clemson. From 1994-2002, Clemson saved a total of over 16,000 cubic yards of landfill space by diverting over 5,400 tons of waste. Approximately 25% of waste generated at Clemson is recycled, while 75% is sent to the landfill. Since the year 2000, Clemson has recycled over 633 tons of paper, not including newspaper and magazines, saving over 10,000 trees and 1,900 cubic feet of landfill space. In addition, Clemson has recycled 216 tons of newspapers, and approximately 4.5 tons of aluminum cans, saving enough energy to power a 100-watt light bulb for 112 years.

The Lighten Your Load Recycle Program at Clemson collects unwanted but usable items at the end of the school year. It has donated more than 6,500 pounds of clothing and household items to the Salvation Army, over 3,500 pounds of non-perishable food items to Clemson Community Care, and several truckloads of loft lumber to a local chapter of Habitat For Humanity.

Solid Waste:

Clemson disposes of solid waste for \$0.55/ton for up to 80 tons per week for an annual total cost of \$135,000. Administrative estimates approximate that 75% of collected solid waste is sent to a landfill while 25% is recycled.

Transportation:

In 1992, approximately 19,900 parking permits were issued for the 11,194 available spaces while approximately 24,425 parking permits were issued for the 13,392 available spaces in 2003. The number of parking spaces has increased by 2,098 or 18.7% since 1992 while student FTE has decreased by approximately 6.0%. 257 moped/motorcycle permits were issued during 2002/03.

According to a Campus Planning Services study, commuter parking at the periphery of campus is only 25.02% utilized (633 vacant spaces) during peak hours and visitor spaces in the campus core are at 73.13% capacity (53 vacant spaces) during peak hours. According to the Clemson University Master Plan, there are 83 total parking spaces per 100 Clemson students; this is compared to an average of 55 per 100 students at 80 institutions nationwide. Since 2000, 434 new parking spaces have been created and another 132 are under construction. Trends indicate that a shift from smaller parking areas located within the campus core are being replaced by larger tracts of parking at the campus's periphery.

Student parking permits today cost \$67; this is up \$49 or 272% from 1992's \$18 rate. Approximately 53% of Parking Service revenue is generated from the sale of parking permits while 41.2% of parking service revenue is generated from parking citations and towing penalties. Facilities maintenance and construction accounts for 22.4% of the Parking Services budget and they have noted that it costs approximately \$1,200 to construct a traditional parking space and approximately \$12,000 to construct a parking garage space.

Clemson Area Transit (CAT) operations and capital is funded by 22.1% of the Parking Services Budget. CAT serves both the campus and surrounding communities.

In 1992, Clemson's Motor Pool consisted of 195 vehicles and approximately 500 vehicles are owned by individual departments. In 2003, the motor pool was reduced to 166 vehicles and 726 vehicles were owned by individual departments. As such, Clemson University's central fleet has decreased by 29 vehicles or 14% while individual department ownership increased by 45.2%. Motor Pool controls 34 flex fuel vehicles; however, they do not utilize the cleaner fuel source. It has also been noted that while the Motor Pool continues to upgrade its fleet with newer, more efficient vehicles, a disconnect from this trend is observed in the individual departments.

Motor Pool vehicles alone consume approximately 90,000 gallons of fuel annually which results in 1,738,800 pounds of CO₂ emissions. During 2002/03 the Motor Pool experienced an average fuel economy of 18.4 mpg, traveled over 2,046,500 miles, and spent \$161,511.71 on fuel and lubrication products. Over the last 10 years approximately 20,000 gallons of motor oil has been recycled and 1,000 gallons of engine coolant, 1,000 automobile batteries, and 5,000 used tires have been disposed.

Waste & Storm Water:

Clemson University treated 268,055,000 gallons of wastewater for FY 2002/2003 and 240,522,000 gallons of wastewater for FY 2001/2002. The National Pollution and Discharge Elimination System (NPDES) permits effluent from the waste treatment plant. Approximately 60% of Clemson's annual water use returns to Lake Hartwell. Clemson University's wastewater sources are: residential wastewater, dining facilities, laundries, boiler and cooling tower "blowdown," and process cooling.

Storm water permits are required when a locale reaches a critical population; Clemson University however is not currently obligated to hold a municipal storm water permit due to the population of the campus.

Water Use:

Clemson University purchased water from Duke Power for \$1.05 per thousand gallons until 1992. Currently water is purchased from Anderson Regional Joint Water System (ARJWS) for \$0.95 per thousand gallons or 9.5% less. Approximately \$463,400 was spent on water usage and maintenance during 2002/03 and the total water consumption has increased by 10 million gallons or 2.60% from 1995 to 2003. Clemson University uses 0.02% more water than it did in 1995 while Clemson students use 2.62% less water than they did in 1995.

Only a portion of the irrigation networks on campus have a stand alone metering system. Readings from these systems indicate that some 71 million gallons of water were utilized for irrigation purposes last year alone (\$67,545). It is estimated that total metered and un-metered irrigation water could approach costs of \$100,000 or greater indicating numerous opportunities for improvement within irrigation practices and infrastructure. Using national averages on leaky infrastructure, nearly \$37,525 to \$112,575 would have been lost last year alone due to Unaccounted for Water (UFW).

Quarterly flushing of Clemson's infrastructure consumes up to 1 million gallons each year and ARJWS tests Clemson's water supply bi-annually. In an effort to reduce total water consumption, The LEED program has been adopted as a possible means by which to enhance Clemson's water efficiency within new and renovated buildings.

Workplace Environment:

In 2003 the Environmental Health & Safety Manual for Clemson was revised. Occupational health related issues within Clemson University are regulated by SC Department of Health and Environmental Control (DHEC), South Carolina Occupational, Safety, and Health Administration (OSHA), and the Nuclear Regulator Commission (NRC). Clemson's total number of reported occupational accidents and injuries for 2003 was 268. Sprains, strains, spasms, and tendonitis topped the list with 103 injuries reported.

Clemson Fire Department and Emergency Medical Service has 25 full-time employees, 9 student employees, and 15 volunteers; up by 2, 6, and 12 people respectively from 1991.

Within the last four years nearly \$4 million has been spent on indoor air quality and HVAC upgrades and renovations around campus. With regards to indoor air quality, annual maintenance costs are approximately \$445,000 while the filter replacement costs Clemson about \$200,000 per year in labor and materials.

Note to Readers:

The aforementioned information has been provided for the quick reference of data only and should not be taken out of context. For explanations and a more detailed account of this information please refer to the final report document. See <http://clemson.edu/cuec>.



<http://clemson.edu/cuec>