The School of Civil and Environmental Engineering (CEE) at Georgia Tech has a long tradition of excellence in engineering education. Since our first student, Maryon McDonald Lawrence, graduated in 1902, we have been recognized as a school that provides a rigorous and comprehensive educational experience. Over the last several decades, we have seen an increase in the size and quality of our graduate programs where research and classroom instruction are combined to sharpen problem-solving skills and to develop expertise within one of our subdisciplines. Today, our School is home to more than 600 undergraduates and nearly 300 graduate students. We offer degrees ranging from a B.S. to a Ph.D., and we provide a range of educational opportunities within our degree tracks. Our enrollments continue to increase in CEE, as does our national and international reputation.

In the latest rankings of undergraduate civil engineering programs, CEE ranked third within U.S. engineering schools. We believe that our strong reputation is based on several factors, including our attention to engineering fundamentals, investment in state-of-the-art technology, and interaction with the world-class scholars that comprise CEE’s faculty.

To sustain and enhance our School, we in CEE are constantly evaluating our curricular offerings and diligently overseeing a continuous evolution that will ensure that the students of today (and tomorrow) are well prepared for successful careers in engineering and related fields. In a world with unprecedented rates of technological advances, and with an ever growing globalization of the engineering workforce, these changes seem to be coming faster than in the past and we are responding in many ways. Here are a few examples of how we are responding:

**International Programs at GT:** Georgia Tech has set a goal that 50 percent of our students participate in a meaningful international experience as part of their education. We recently approved an international designation within our B.S. program that requires two semesters abroad along with a foreign language skill, in addition to the same set of engineering courses that are required for the current B.S. degree. This program is demanding and parallels our longstanding Cooperative Education Program (COOP) as a program of study that distinguishes our graduates.

**Environmental Engineering:** We have proposed a new B.S. degree track in environmental engineering. Although we are currently seeking final approval from the Board of Regents, it is possible that our first graduates will receive diplomas in only two years! This is possible by design. The core courses between our civil and environmental
degrees are similar, preparing students with the same basic skills. Only at the junior and senior years do students begin to focus elective offerings toward one or the other of our two areas of study.

Communication and Leadership: Studies suggest that the decision to “fast track” engineers into leadership positions in U.S. firms is made within the first year of employment. This decision is made with the recognition that leaders must be more than simply competent in their technical areas. They must be adept in various communication media and they must operate well within groups of diverse individuals.

We are fortunate in CEE to have alumni that support and encourage the integration of communications education throughout CEE’s course offerings. We are the only civil and environmental engineering program in the country that I know of that has a communication specialist on its faculty, Dr. Lisa Rosenstein, whose presence is made possible by the generosity of an alumnus, Joseph Mundy, and his family.

This is an example of how we strive to provide the best possible education to our students, an education that meets the needs of today’s dynamic world.

We hope you enjoy this edition of the CEE newsletter. For those who have not been to the campus lately, please drop by when you are in the area or visit our Web page at http://www.ce.gatech.edu/, which is updated daily, to keep you abreast of what is going on in the School.

Go Jackets!

**ALUMNI PROFILE**

**CEE’s Favorite Son**

This past September, Dr. G. Wayne Clough marked his eleventh anniversary as president of the Georgia Institute of Technology. During his tenure, Georgia Tech has not only been ranked among the top ten universities in the nation for seven consecutive years, it has also upgraded its infrastructure and facilities to position the university to drive innovation for years to come. From the recruitment of top undergraduate and graduate students to attracting high-quality faculty and researchers and hiring exceptional staff, Georgia Tech is quickly becoming known as not only one of the premier universities in the nation, but as a global university with significant international partnerships. Much of this can be attributed to President Clough’s leadership.

The resolve to transform Georgia Tech into a premier global institute may have its roots in the fact that Clough is not only the president but a two-time alumnus of Georgia Tech, having received both his bachelor’s and master’s degrees in civil engineering here. One may say that he gets to give back to his alma mater daily. When asked about the significant changes he has seen since he was a student, he remarked, “Georgia Tech is truly a global institution now. Nearly 40 percent of our students are involved in a study abroad program. Many are involved in interdisciplinary research. This was not the case when I attended Georgia Tech.” He attributes part of this growth to the parallel expansion in the metro Atlanta area. Atlanta’s growth over the past thirty years has propelled Atlanta into the diverse and fast-paced city it has become. This, coupled with the enormous economic prosperity in the Atlanta metro area, gave Georgia Tech a tremendous opportunity. With a solid background in civil engineering, President Clough has been able to capitalize on these changes and attract resources and people to the Institute.

Civil engineering, a profession that largely goes unnoticed by people in society, has been recently highlighted in the media with the record-breaking 2005 hurricane season marked by the devastation of Hurricane Katrina. Civil engineers from the Army Corps of Engineers were among the first people called upon to repair the breached levees in New Orleans, and civil and environmental engineers will be relied upon to help rebuild the Gulf Coast region. Still, the future of civil and environmental engineering is a topic of debate within the profession. Many people don’t know what civil engineers do. In response, the American Society of Civil Engineering (ASCE) is recommending that civil and environmental engineering programs move toward a master’s degree in the profession in order to raise salaries and prestige to a level enjoyed by other engineering professions.

When asked what he thinks CEE students need in order to be successful, Clough recommends other skills that should be mastered by students. “CEE students will need to be adaptable to the needs of society and be able to see across into other disciplines to solve the complex problems that our society will face in the future. They will need to learn to be good leaders, and to be leaders that are also team players. Study abroad enables students to acculturate to other societies which helps them in turn become better leaders. In order for CEE students to succeed, they will need to be creative and be able to draw on information from many different areas outside of traditional disciplines.” The Civil and Environmental Engineering program at Georgia Tech is in a unique position to define the direction for the future with a unique course...
of action. Clough also sees what he calls “mega trends,” which he describes as the blurring of engineering and science, as a challenge to the civil and environmental engineering profession. Civil and environmental engineers need to be able to work in areas of biotechnology, nanotechnology, and energy, for example. Clough says, “A large question that this poses is how we will be able to maintain our professional identity in the face of these new mega trends.”

When asked about the major issues facing civil and environmental engineers, Clough says that the most important issue is the ever-growing demand for clean water and how it will be managed across states, regions, countries, and continents. Civil and environmental engineers are the experts that will be called upon not only to help build the systems that will create and deliver clean water, but to help shape the public policies that will govern the use of the water. Clough also cites other issues, such as housing, public health, and water sanitation, as areas where civil and environmental engineers will play key roles. “There will be over eight billion people on the planet by the year 2025,” he says. “Civil and environmental engineers will be relied upon more than ever to help deliver the basic necessities for human quality of life. The CEE program should also focus on the needs in developing countries around the world as an area where they can lead and distinguish themselves from other institutions.”

**Frank Wyatt’s Roll of the Dice Pays off in Las Vegas**

Las Vegas, Nevada, long a gaming and entertainment mecca, is also one of the top ten fastest-growing cities in the United States. People are flocking to the desert to play hard and live well, and alumnus Frank Wyatt, CEE ’76, is helping people with the latter by building and developing high-quality homes in the Las Vegas area.

Why are people so interested in living in Las Vegas? “One of the biggest reasons is that the climate is really nice,” says Wyatt. “As the city has grown, there are more things being built in-town that make it a nicer place to live.

Dice Pays off in Las Vegas

Frank Wyatt in front of the Pinnacle Homes zero energy home

Job opportunities are very good because we are growing and more businesses are coming in. It’s also a huge retirement area. All that adds up to a lot of growth.”

Wyatt, who grew up in the “rival” city of Reno, is familiar with Las Vegas’ history of expansion, which continued unimpeded even during the Great Depression of the 1930s. Since 1982, he has been betting on the city’s history of growth to build his career. More than twenty years ago, Wyatt took a job in Las Vegas, and has since worked steadily in the city, first as a consulting engineer and then in construction and development before starting his own business.

Although known for building a successful business, Wyatt didn’t plan on becoming a builder. Before coming to Georgia Tech, he attended the Air Force Academy through an appointment from a Nevada senator. While at the Academy, his eyesight deteriorated from 20/20 to 20/60, preventing him from becoming a pilot. Reluctantly, he resigned from the Academy. Fortunately, he had a roommate from Georgia who introduced him to Georgia Tech. “I pretty much came to Atlanta sight unseen,” says Wyatt of his decision to enter Georgia Tech’s CEE program. “I had never been to Atlanta before, so I looked at it as an opportunity to see a different part of the country. It turned out to be a very good thing.”

After graduating from Georgia Tech, Wyatt returned to Nevada, taking a gamble in 1992 by forming his own business, Pinnacle Homes. “We put all of our financial resources into starting the business,” says Wyatt. “At the time, we viewed it as a calculated roll of the dice.” His gamble paid off. “We’ve gone from 10 houses a year to 150-200 houses a year,” he says, with Pinnacle Homes now offering housing ranging from 1,500 square feet to upwards of 5,000 square feet at prices from the low $300,000 range to nearly $800,000. “I use my civil engineering background at Georgia Tech almost every day,” says Wyatt. “It assists me in making quality decisions regarding land acquisitions and development as well as problem solving.”

He relies on those problem-solving skills to address the major challenges posed by the Las Vegas Valley, where land supply is tight and water is limited. Federally owned land rings the city; outside the ring, land is not for sale. “I was at a conference recently and the speaker said that based on the current consumption of property, we have about a ten-year supply left in the city,” says Wyatt. “After that, we are out of land.”

The availability of water also poses a huge challenge. The Las Vegas Valley receives a 300,000-acre allotment of water from Lake Mead, which has allowed the city to grow at the current rate; however, Las Vegas is approaching the maximum draw from the lake. The Southern Nevada Water Authority has

Continued on page 5
CEE Professor Encourages Atlantans to Commute

What if you were charged five cents, ten cents, fifteen cents, or even thirty cents per mile daily to drive your vehicle? Would you change your driving behavior?

Transportation Professor Randall Guensler, along with his research team from Georgia Tech’s School of Civil and Environmental Engineering (CEE), is determining at what point—if any—consumers will respond to pricing and alter their travel behavior. His study, Commute Atlanta, is sponsored by the Federal Highway Administration, the Georgia Department of Transportation, and Georgia Tech, and will track the commuting patterns and behavior of drivers in the metro Atlanta area in three phases.

The project’s first phase began with a baseline study monitoring the travel patterns of drivers in a given household for one year. Using a special data collecting system known as the GT Trip Data Collector, which gathers data from vehicles on a second-by-second basis, Guensler and his researchers monitored vehicle speed, position, and engine operating characteristics, along with global positioning data, in order to gain insight into commuters’ travel behavior and roadway conditions. Project participants were asked to keep a travel diary and the researchers conducted an employer survey to find out what incentives or options employers offer these commuters to carpool, take transit, and/or telecommute to work.

Guensler’s research team recently began phase two, the mileage pricing phase, during which the cost of travel is broken down on a cost per mile basis. The cost per mile is factored from an average cost of the commuters’ insurance premiums, gas taxes, and registration fees. In January 2006, commuters will be given a household account of $300. For every mile that is driven in the first quarter, five cents will be taken from that household account. If the household’s commuters drive less than they did during the same time last year when the baseline data was collected, they will receive a check from the remaining balance in their household account. During this phase, the cent-per-mile incentive will increase from five cents to ten cents, with a cap of fifteen cents by the third quarter. “Once you’ve paid for things like your insurance premium or registration fee it doesn’t factor into your costs,” explains Guensler, “but if you pay it on a daily basis, it tends to sit there in your mind every day. The idea is to put the cost of travel in front for the driver to see if they will pay attention and change their travel behavior.”

During the study’s third phase, incentives will shift from decreasing mileage to avoiding traffic. Commuters’ household accounts will be increased to $1,000, but their costs will also rise. They will pay fifteen cents per mile traveled, with an additional cost of twenty cents per mile if the driver is in a congested area. As in the first phase, commuters’ vehicles will be outfitted with a special monitoring device, this time a little LCD terminal displaying the price they are currently operating under and lights warning them when they are in congested areas. The display will help drivers plan their trips to help them avoid congestion and save money. Currently, Guensler and his research team are working on the programming for this phase, which will begin in July 2006.

Guensler is optimistic that the study will offer rewarding information, including information about the breakdown in speeding rates across ages and genders. Study data has already confirmed that on average, the fifteen- to twenty-four-year-old age group drives 7 miles an hour over the posted speed limit and the sixty-five-year-old age group drives 4.5 miles per hour over the speed limit. It may also lead to more interesting data, such as where participants have parked their cars. Already, the study has led to one commuter finding his missing car. “He called the hotline to report the car was stolen. The next day, he had his car back in his possession,” says Guensler, who used the study’s data-monitoring devices to locate the car. “It was found exactly where we said it was going to be.”

All Ports in the Storm

CEE professors assess damaged ports in New Orleans area

On October 17, 2005, Dr. Reginald DesRoches, a CEE associate professor, and Dr. Glenn Rix, a CEE professor, led a small team of engineers to New Orleans, Louisiana, to conduct a reconnaissance assessment of the damage done to the ports resulting from Hurricane Katrina. The trip was commissioned by the Coasts, Oceans, Ports, and Research Institute (COPRI), an institute of the American Society for Civil Engineers (ASCE). COPRI sends small teams of engineers to assess the damage done to ports resulting from hurricane events. COPRI is an institute of the American Society for Civil Engineers (ASCE) that provides technical assistance to the port industry.

Dr. Reginald DesRoches at the 9th Ward levee breach

Hurricane Katrina. The trip was commissioned by the Coasts, Oceans, Ports, and Research Institute (COPRI), an institute of the American Society for Civil Engineers (ASCE). COPRI sends small teams of engineers to assess the damage done to ports resulting from hurricane events. COPRI is an institute of the American Society for Civil Engineers (ASCE).
out specialty teams after natural disasters occur to report on the damage and any lessons that can be learned. DesRoches and Rix were selected by COPRI for their work on the Network for Earthquake Engineering Simulation’s Grand Challenge Project Seismic Risk Mitigation for Port Systems, for which DesRoches is deputy director. DesRoches explains, “The issues to ports are the same in terms of damage and loss as with an earthquake.” The team will assess the damage and seek to find ways to reconfigure the ports in the future to minimize the physical destruction and loss of operations to the ports.

The ports in the New Orleans area are critical for the transport of such commodities as grain, coffee, and oil products. “More coffee comes through the Port of New Orleans than anywhere else in the world,” says DesRoches. “We may see an impact on coffee prices as a result.” The Port of New Orleans, the largest port in the area, had significant wind damage. It did not have any physical damage due to storm surge or flooding. The engineering team visited the New Orleans region for five days. The first day was spent getting familiar with the area. DesRoches explains, “The second day we went on a helicopter flight surveying the area for damage. This was very useful because we could see the whole area. After that, we broke into two teams and went from port to port. There were about five or six major ports and some smaller ones. We looked at the ports and the facilities to assess the damage. In some cases we talked to port managers to find out any information they had on how the damage occurred,” says DesRoches.

The team discovered that one of the biggest issues facing the port managers is the lack of manpower. There are simply not enough workers left in the area to make the facilities fully operational. “The biggest shock to all of us was just how empty it was down there, even in the French Quarter. It was kind of a ghost town. You see a lot of construction workers, FEMA workers, and contract workers, but very few residents or tourists are in the area,” remarks DesRoches. A critical issue brought up during the trip was how to find ways to limit disruptions. How do you get back up and running as quickly as possible? One key finding from the port managers was that it became very important to have alternative contact or cell phone numbers in order to communicate with employees during the aftermath of Hurricane Katrina. Without alternative contact numbers, there was no way to communicate with one another.

Typically, after natural disasters, assessment teams will record all the damage before repairs begin. However, in a situation such as this, there was the logistical problem of accessing the damaged ports. Also, the port owners were busy trying to restore activity and weren’t as receptive to the team directly after the hurricane hit, says DesRoches. “When we did go, they were more receptive. They shared all of the data they had and they were willing to talk to us and provide access to all of their facilities.” The team will prepare a report for COPRI, which will go out to all the port owners around the country. DesRoches will return to New Orleans to focus on assessment of the bridges that were damaged as a result of the hurricane. “I am leading a team of eight students and engineers to look at the damage done to bridges in Louisiana and Mississippi,” explains DesRoches. “It’s a joint trip between the Mid America Earthquake Center and the Technical Council on Lifelines Earthquake Engineering, which is also part of ASCE. We will look at the bridges that collapsed. We are doing the same thing with the bridges as we did with the ports. We’ll look at the physical damage and learn lessons for repair strategies,” says DesRoches.

already begun to look for alternative water sources for the area, staking a claim on water in some of the rural counties to the north of Las Vegas as far away as a few hundred miles. Within the next five to eight years, Las Vegas should start receiving some of that water, says Wyatt. If this happens, the Valley will continue to expand.

Wyatt sees these challenges as an opportunity to grow his company. Pinnacle Homes recently partnered with the University of Nevada, Las Vegas, to build a zero energy house, which produces as much energy as it consumes in a single year. “It was an interesting project,” he says. “We have solar panels on the roof. It was built with concrete exterior walls and it has a solar heating system. Right now it is currently being monitored right next to one of our conventional homes with the same floor plan.” He hopes the project will lead to more sustainable housing. “What we hope to gain is to get our feet wet on the technology side of things so that we can incorporate them into some of our homes down the line,” says Wyatt, who is in the initial stages of developing a new housing line that would be on the leading edge of energy conservation in Las Vegas. “The nice thing is that we live in an environment that is sunny most of the time,” he says, “so we will try to use that to our advantage.”

In recognition of Wyatt’s many achievements and progressive vision, Georgia Tech’s College of Engineering recently presented him with a Distinguished Engineering Alumnus award, and this fall, he became a member of the Civil and Environmental Engineering External Advisory Board. “Through being part of the Board, I hope to be able to contribute toward assisting new civil engineering students in their transition into the profession they have chosen,” says Wyatt. “I am also looking forward to working with the Board in helping to improve and expand the CEE program at Georgia Tech. I wouldn’t be where I am today without the education I received from both Georgia Tech and the Air Force Academy.”
NEW DEVELOPMENT

Laurie Somerville has been named director of development for the School of Civil and Environmental Engineering (CEE). She will be responsible for the design and implementation of a comprehensive program to include private sector, corporate, and foundation support for CEE.

Most recently serving as leadership gifts officer for the Georgia Tech Alumni Association, Somerville has ten years of development, sales, volunteer management, and fundraising experience. Prior to her Georgia Tech positions, she was project manager for Suddes Partners, an Atlanta-based firm specializing in non-profit capital campaigns, and was the North America sales and marketing director for Sportsworld International, a British firm that operates global sporting events such as the World Cup Soccer, the Grand Slam Tennis Events, and the Olympics. In both positions, Somerville was responsible for securing leadership gifts or sponsorships from individuals, corporations, and municipalities.

Somerville graduated summa cum laude from Ohio University with dual bachelor’s degrees in English and marketing. She also authored an undergraduate honors thesis entitled “Privacy on the Internet” that was taught in a business law class for several years.

Somerville will play an integral part in helping to secure the resources required to grow and maintain the Civil and Environmental Engineering program for the future. She plans on meeting and greeting many CEE alumni in the months ahead. If you are interested in learning more about how you or your company can be involved in the Civil and Environmental Engineering program, contact Ms. Laurie Somerville via e-mail at laurie.somerville@ce.gatech.edu or by phone at 404.894.2772.

NEW FACULTY

Dr. Dominic Assimaki
Assistant Professor, Geosystems Engineering

Dr. Dominic Assimaki joined the School of Civil and Environmental Engineering (CEE) at Georgia Tech in July 2005. She received her B.S. in civil engineering from the National Technical University of Athens, Greece in 1998. She continued her studies at the Department of Civil and Environmental Engineering at MIT, where she obtained an M.S. in 2000 and an Sc.D. in 2004. During her doctoral studies, she also participated in the European Research Training Network SAFERR as a Young Researcher in GDS in Paris, France, from January 2001-September 2002, and received a graduate research fellowship from the National Technical University of Athens, Greece, from September 2002-August 2002. After graduating from MIT, she worked as a post-doctoral researcher at the Institute for Crustal Studies at the University of California, Santa Barbara, from February 2004-June 2005. Her primary research interests are in numerical methods in earthquake engineering and geophysics, and include forward simulations of dynamic nonlinear soil response, soil-structure interaction, and scattering phenomena in heterogeneous media, as well as inverse problems. She is a member of the American Society of Civil Engineers, the Earthquake Engineering Research Institute, the American Geophysical Union, the Seismological Society of America, the International Association for Computer Methods and Advances in Geomechanics, and the Southern California Earthquake Center.

NEW ASSOCIATE CHAIR

Dr. F. Michael Saunders
Professor

In July 2005, Professor F. Michael “Mike” Saunders expanded his School of Civil and Environmental Engineering (CEE) activities, accepting new positions as associate chair of CEE and associate director of the Georgia Tech Savannah campus. Both positions are focused on enhancing the integration of CEE undergraduate and graduate programs for both the Savannah and Atlanta campus locations. In addition, he is the coordinator of graduate engineering programs for the Savannah campus. Saunders remains a professor in the Environmental Engineering program and will continue his research activities on the main campus, while developing and expanding his coastal-research activities in Savannah. He is also an adjunct professor at the Skidaway Institute of Oceanography (SkIO) in Savannah and is looking to reconnect with research activities in the coastal-ocean arena with SkIO colleagues.
Against Odds, Student Seeks Higher Education

For some students, getting the education that they desire comes with great courage and sacrifice. Suzanne Duncan, an undergraduate Georgia Tech student in civil engineering, is just such a student. The path that led her to Georgia Tech could have easily taken her in many other directions, but tough choices and the tremendous courage to follow her dream guided her to the School of Civil and Environmental Engineering (CEE).

A fourth-year CEE student who will graduate in the spring semester, Duncan is a typical non-traditional student. A divorcée with a nine-year-old son, Kyler, she dropped out of high school at age sixteen to get married and have a baby, only to discover that she didn’t just want to earn a GED—she wanted to learn. “I dropped out of high school for six months, then decided I couldn’t stay out of school because I liked school so much,” says Duncan. “I went back and was able to finish and graduate with my class.”

After graduating from high school, she attended community college part-time while working full-time in her hometown in Florida, pursuing a chemistry degree while working in a lab. Unsatisfied by her job, Duncan decided she needed a more challenging profession. “I looked at my parents’ friends who were engineers and who had done really well in their profession and had the same kind of values that I had admired,” she says. “They had all graduated from Georgia Tech. That’s when I decided that this is where I wanted to go to school.”

Georgia Tech was the only school she applied to and structural engineering was the only major she considered. “You would think that with my background in chemistry that I would have gone into environmental engineering,” says Duncan, who calls her decision to attend Tech “probably the most important thing that I have done.” “It has a lot to do with the fact that the professors here in structures are really good professors and they are people who enjoy what they do,” she says.

As the current president of the Georgia Tech chapter of the American Society of Civil Engineers (ASCE), Duncan strives to connect students and professors. “One of the main things I hope to accomplish is bringing the students and faculty closer together because I have had such a great experience with faculty members,” says Duncan. “I think they are really great people. I just want students to know that faculty members are approachable.”

Her plan is working. The former captain of Georgia Tech’s steel bridge team, which earned third place at the national Steel Bridge competition, Duncan recently organized one of the most successful ASCE industry banquets and has seen membership in this year’s Georgia Tech ASCE chapter swell.

After graduating this spring, she plans to attend graduate school and Georgia Tech may be the only school she applies to again. Meanwhile, she and Kyler will spend the rest of this year going to school and doing their homework together side by side. Says Duncan, “I think it’s important that he knows that it’s always a possibility to follow your dreams.”

Graduate Student has a “Chilly” Experience in Greenland

Many people spend the month of July vacationing, enjoying warm weather while backpacking, hiking, or visiting the beach.

Gayle Hagler is not most people. This past July, Hagler, a Ph.D. candidate in Georgia Tech’s Environmental Engineering program, spent most of the month collecting snow samples on the Greenland ice sheet, where temperatures range from 20 to -30 degrees Fahrenheit and the sun never gives way to darkness. She and fellow Georgia Tech Ph.D. student Roby Greenwald traveled to Greenland under the direction of their advisor, Dr. Mike Bergin, a CEE associate professor, to gather preliminary samples of aerosol pollution on the ice sheet for a larger future study involving the University of New Hampshire, the University of Wisconsin, and Georgia Tech.

“In Greenland, people treat the glaciers or ice sheets as an archaeological site for air pollution or atmosphere in general,” she explains. “You can look at the ice core and look back 100,000 years ago and try to determine what the atmosphere looked like.”

The Georgia Tech team used their initial Greenland visit as a dry run for their three-month-long trip in May 2006. “We went on our trip this past summer to make all of our mistakes,” says Hagler. One mistake she and her teammates did not make was skimping on the extensive preplanning the trip required. “You have to calculate and plan for everything you need to make sure you’re not forgetting anything,” explains Hagler. “There is no Home Depot to run to.” Their preplanning calculations allowed them to see they would need about 5,000 bottles for their research, requiring them to recycle and clean the bottles while in Greenland.

“We had some long nights in the lab,” she says.

After long nights in the lab, the team spent long days in Greenland, living out of a tent pitched a half a mile away from a National Science Foundation (NSF) base camp whose lab they used. Each day, the team spent hours in the
frightful weather collecting samples of two classes of carbon compounds: elemental carbon, known as black carbon or soot, which is created by combustion from human-related activities such as coal burning or forest fires, and organic carbon compounds that are linked to human and natural sources. In addition to the cold weather, the team also had to prevent carbon contamination through physical labor. “You don’t want any carbon contamination at the sample site, so we’d have to walk out to a clean site with shovels and saws,” explains Hagler. “We dug two different snow pits at one meter and three meters deep, taking samples all the way to see patterns of pollution transport to the ice sheet over the years.”

Hagler then melted some of the snow at the NSF lab because not all of it could be transported to her Georgia Tech lab for study.

The intense fieldwork allowed her to see how the industrial age has affected climate change. “The concern is that what is trapped from the air in the snow can cause a chemical reaction,” says Hagler. “We are worried that the things that can absorb sunlight might warm the Greenland ice sheet and accelerate the melting.”

In addition to facilitating lab work, the NSF camp also provided a surprising benefit: gourmet food. “We were so spoiled for food,” says Hagler. “We had two professional chefs that kept everyone well fed.” Another bonus was the opportunity for Hagler and her team to meet people from different countries who are interested in exploring the mystery of what the ice holds. “It was really interesting to be up there and meet people from all over the world, like France, New Zealand, and Switzerland,” she says.

Now that the team is back in their Georgia Tech lab, their work isn’t over. Hagler and her teammates are currently measuring their samples from Greenland, dating organic carbons, black carbons, and particles. With calculated planning and some degree of luck, their May trip will also be successful, allowing Hagler to analyze the data next year and record the results in her thesis.

After that, Hagler says, she is not quite sure where her next adventure lies. “I am interested in two different things,” she says. “I really love air chemistry and fieldwork, but I also love applied engineering projects that aren’t in research, especially in developing countries like China.” One thing is certain: Hagler hasn’t ruled out more pioneering adventures. “I haven’t figured out if I will do research or go trotting off to do more applied engineering projects,” she says. “I’m trying to figure out where all the pieces will fit.”