EEES NEWS

Student News — Summer, 2011

In May a group of Clemson engineering students led by EEES graduate students **Christina Anderson** (MS, EE&S, 2011) and **Catherine Ruprecht** (PhD, EE&S) traveled to Liberia, West Africa to implement sustainable engineering projects which the students had worked on in their Creative Inquiry class. The Clemson group worked alongside a group from University of Michigan and a group from University of Liberia. The five undergraduate students built a solar powered dehydrator, a biogas producing latrine, two basketball hoops, a playground and an electricity generating merry-go-round.

David Hisz (PhD, EE&S) won an Outstanding Student Paper Award for his presentation at the 2010 Fall AGU Meeting in San Francisco, California. According to the AGU citation, **Dave's** "presentation was recognized as among the best of a strong group of student presenters, which sets an example for his fellow students and the entire AGU membership." **Dave's** award-winning paper was entitled: "Characterization of Fractured Rock during Well Tests using Tilt-X, a Portable Tiltmeter and Extensometer for Multi-Component Deformation measurements," and it is part of the NSF-funded research he is doing for his PhD dissertation. **Dave's** advisor is **Dr. Larry Murdoch**.

PCB cleanup mired in debate

The attached article ran on the front page of the Greenville News Sunday, June 12. The pictures show Geology undergraduates **Ben Douglass** and **Josh Smith** investigating sediment transport in 12-Mile Creek as part of their Creative Inquiry project. They will be seniors in the Geology program next year.

Read Full document: PCBs

Salmatta Ibrahim (MS Hydrogeology) recently received an award from the Margaret McNamara Memorial Fund (MMMF) administered by the United Nations World Bank. This was a competitive application process, and she was one of only 13 people to receive a MMMF award. **Salmatta** was presented with a check that she will use towards expenses while studying at Clemson. **Salmatta's** advisor is **Dr. Mark Schlautman**.

EEES students **Adam Mangel** (PhD, EE&S) and **Andrea Creighton** (Undergraduate Geology) have been teaching **Dr. Stephen Moysey** how to use a shovel as they work to fill a new large-scale (4m x 4m x 2m) flow tank that will be used to conduct a variety of experiments focused on preferential flow and transport in heterogeneous soils. The project is being funded by the Department of Defense to investigate the impacts of hydrology on landmine detection using ground penetrating radar.

Glenn Skawski (MS, Hydrogeology) studied in Japan this summer as part of a prestigious 2011 National Science Foundation (NSF) Summer Travel Fellowship. He worked with Tomo Tokunaga at the University of Tokyo, a leading investigator in geomechanics and instrumentation. **Glenn** learned about innovative applications of fiber optic sensors to measure deformation, which have been developed by Prof. Tokunaga and his colleagues. The information exchange benefits all, as **Glenn** also taught his Japanese hosts about extensometers and downhole instrumentation developed at Clemson. The NSF Fellowship encourages recipients to travel in their host country and become immersed in its culture in addition to pursuing their studies. **Glenn's** advisor is **Dr. Larry Murdoch.**

Ty Taylor (MS, Hydrogeology) second-year graduate student in the Hydrogeology program worked as an Intern Geologist for CONSOL Energy in Indiana, PA, during the summer. He analyzed geophysical data from gas-producing wells drilled into the Marcellus Shale. This project utilized the latest technology of horizontal drilling and hydraulic fracturing.

Kay Millerick (**Dr. Finneran's** Visiting Scholar) and **Francisco Barajas** (PhD, EE&S) attended the US-EC Course in Environmental Biotechnology, Lausanne, Switzerland. **Francesco's** advisor is **Dr. David Freedman.**

Tony Johnston (MS, EE&S, 2011) successfully defended his MS thesis "Developing a Greenhouse Gas Emissions Calculation Tool for Water Utilities" on July 8, 2011, before his committee which included **Drs. Tanju Karanfil** (chair), **David Ladner**, and **Cindy Lee**. **Tony** is now working on his MBA here at Clemson.

Holly Garrett (MS, EE&S) and Students for Environmental Action (SEA) will meet every other Sunday in McAdams 116 at 4:30pm beginning Sept. 11th. Next meetings are Sept. 25th, Oct. 9th and Oct. 23rd, so mark your calendars! This is a group for undergraduate and graduate students as well as faculty, so we hope to see you there!
More info at our website: www.clemsonsea.org or our Facebook page www.facebook.com/cusea.

SEA will be sponsoring the Moving Clemson, Moving Planet Day on Friday, Sept. 23rd which will get us active and moving while also raising awareness about using "too many fossil fuels which driving climate change." Keep an eye out for more info about a community bike ride and other events! Visit http://www.moving-planet.org/events/us/clemson/1367 for more info about this international Day of Action sponsored by www.350.org.

This summer **Lee Hering** (MS, EE&S) worked with ESG Operations at the Warner Robins Water and Wastewater Plants in Warner Robins, GA, where as an intern he worked closely with several engineers in the early stages of a multi-million dollar upgrade to the plants. His advisor is **Dr. Cindy Lee**.

The **Lee research group** is also deploying a distributed sensor system (DTS) along Town Creek near the Sangamo Weston Superfund site. Over a kilometer of fiber optic cable will be placed in the stream and used to measure temperature changes. This system will identify groundwater flux and possibly fractures within the stream bed. (bottom) **David Hahn** (MS, Hydrogeology**)** is testing the system before taking it on site along Town Creek.

April Gillens (PhD, EE&S) was awarded the 2011 Department of Homeland Security Nuclear Forensics Fellow. She is currently characterizing organic solvents associated with nuclear reprocessing via stable isotopes. This work will provide signatures of organic reprocessing solvents and their degradation products. "The goal of study is to determine whether organic solvents found in the environment have been used in nuclear reprocessing and to understand the steps of reprocessing the solvents experienced. As a graduate student I will identify methods to retrieve nuclear material from environmental samples and I will also distinguish solvents used in nuclear reprocessing from industrial solvent use" says **April**. **April's** advisor is **Dr. Brian Powell.**

2011 Battelle International Symposium on Bioremediation and Sustainable Environmental Technologies

Clemson University was well represented at the 2011 Battelle International Symposium on Bioremediation and Sustainable Environmental Technologies, held in Reno, Nevada, from June 27-30:

• **Barajas, F.**, Lehmicke, L., **Freedman, D.** "Anaerobic Biodegradation of 1, 4-Dioxane at Two Former Industrial Sites in California."

• **Yu, R.**, **Peethambaram, H. S.**, Verce, M. F., and **Freedman, D. L.** "Kinetic Interactions During Organohalide Respiration of 1, 2-Dichloroethane and Ethylene Dibromide."

• **Freedman, D. L.**, **Yu, R.**, and **Hickey, M. R.** "Evaluation of Reductive Dechlorination of Chlorinated Ethenes at Low pH Levels."

• **Hall, R.**, **Murdoch, L.**, **Freedman, D. L.**, and Riha, B. "Aerosol Delivery for Biostimulation/Bioaugmentation of Contaminated Vadose Zones."

Also, **Dr. David Freedman** co-chaired the session ""Addressing the Impacts of pH on Aquifer Bioremediation" and **Rong Yu** (PhD, EE&S), **Han "Frank" Wang** (MS, EE&S), and **Francisco Barajas** (PhD, EE&S) served as technical session monitors (which earned them free attendance and lodging).

Recent Publications:

Bridhikitti, A., and **Overcamp, T.J**., "Optical Characteristics of the Southeast Asia's Regional Aerosols and Their Sources," Journal of the Air & Waste Management Association, 61 (7): 747-754, (July, 2011).

Ye, X., X. Zhang, E. Morgenroth, and **K.T. Finneran**, 2011, Anthrahydroquinone-2,6-Disulfonate (AH2QDS) increases hydrogen molar yield and xylose utilization in growing cultures of Clostridium beijerinckii, Applied Microbiol Biotechnol, In Press DOI: 10.1007/s00253-011-3571-1

Wei, Na, and **K.T. Finneran**, 2011, The Influence of Ferric Iron on Complete Dechlorination of Trichloroethylene (TCE) to Ethene: Fe(III) Reduction Does Not Always Inhibit Complete Dechlorination, Environ. Sci. Technol., 45(17), 7422-7430

Kwon, M.J., E. O'Loughlin, D. Antonopoulos, and **K.T. Finneran**, 2011, Geochemical and Microbiological Processes Contributing to the Transformation of Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) in Contaminated Aquifer Material, Chemosphere, 84(9), 1223-12.

Viet Dang (PhD, EEES) and **Diana Delach** (PhD, EnTox) gave platform presentations at the American Chemical Society meeting in Denver, CO. **Viet** spoke on "Accumulation of airborne polychlorinated biphenyls (PCBs) by Rhododendron maximum" in the symposium "Air-Surface Interactions: Chemistry from Molecular to Global Climate Scales." **Diana** as the recipient of a joint award from SETAC and ACS presented "Chiral signatures of subsidiary PCBs in spiders along an exposure gradient" in the "C. Ellen Gonter Environmental Chemistry Awards" symposium. Both **Viet** and **Diana** work with **Dr. Cindy Lee**.

EEES attendees for the ACS meeting in Denver.

From left to right, **Dr. Cindy Lee**, **Diana Delach**, **Dr. David Ladner**, **Jennifer Wong**, **Viet Dang**, **Sarah Rudy**, and **Hilary Emerson.**

From left to right: **Hilary Emerson,** Ecuadorian professor, **Sarah Rudy**, **Jennifer Wong**, **Diana Delach**, **Meg Smith**, and **Dr. David Ladner.**

WELCOME BACK PICNIC

HEAT??? What Heat?? Over 125 Faculty, Staff and Students attended the welcome back picnic on Friday afternoon after classes started on Wednesday. **Mary Shirley**, **Anne Cummings** and **Ken Dunn** cooked up a batch of hamburgers, hotdogs and veggie burgers for everyone. **Patsy Ellis**, **Betty Cowans**, **Christi Leard** and **Jan Young** laid out the rest of the goodies. Everyone enjoyed the food and fellowship in spite of the heat!!

2011 - 2012
EEES Student Population:

152 Undergraduates
98 M.Sc. students
36 PhD students
20 Tenure/Tenure Track Faculty
4 Lecturer and Research Associates

Welcome New Graduate Students!!!

Mohammad Alzaydan (MS, EE&S)
Jonathan Ball (MS, EE&S)
Aniket Bhattacharya (MS, BE)
Ruthanne Coffey (MS, Hydro)
Nathan Conroy (PhD, EE&S)
Yifan Du (PhD, BE)
Christopher DeMarco (MS, Hydro)
Mahmut Ersan (PhD, EE&S)
Maurice Fagan (MS, Hydro)
Xiaoyu Feng (MS, EE&S)
Archana Ganesh (MS, BE)
April Gillens (PhD, EE&S)
Salley Gould (MS, Hydro)
Phanidhar Gubbala (MS, EE&S)
Jin Guo (MS, EE&S)
Priya Rachel Jacob (MS, EE&S)
Mohammadjavad Kamali (MS, EE&S)
Jauharah Md Khudzari (MS, EE&S)
Janani Krishnakumar (MS, BE)
Matthew Mallard (MS, EE&S)
Adam Mangel (PhD, EE&S)
Jolanta Niedzwiecka (PhD, EE&S)
Erin Partlan (MS, EE&S)
Wilson Beita Sandi (PhD, EE&S)
Timothy Sattler (MS, EE&S)
Jeffrey Schwindaman (MS, Hydro)
John Scott (MS, Hydro)
Dan Shao (MS, EE&S)
Jazmine Taylor (PhD, BE)
Stephen Vance (MS, EE&S)
Junjian Wang (PhD, BE)
Tianzhen Wang (MS, BE)
Christopher Weber (MS, EE&S)
Shuang Xie (PhD, EE&S)
Yu (Helen) Xie (MS, EE&S)
Andrew Yonkofski (MS, Hydro)
Rong Yu (PhD, EE&S)
Bin Zhang (MS, EE&S)
Shuai Zhang (MS, EE&S)
Qi (Zoe) Zheng (MS, EE&S)
Minjie Zhou (MS, EE&S)
Yang Zhou (MS, EE&S)

Biosystems Engineering Joins EEES

The Department of Environmental Engineering and Earth Sciences (EEES) welcomes the Biosystems Engineering undergraduate and graduate degree programs into the Department. Biosystems Engineering has approximately 70 undergraduates and approximately 25 graduate students within the MS and PhD programs. We are welcoming the expertise of 4 faculty members: **Dr. Caye M. Drapcho, Dr. Charles V. Privette III, Dr. Tom O. Owino, and Dr. Terry H. Walker.**

Dr. Caye Drapcho is an Associate Professor who teaches the Fundamentals of Biosystems Engineering (BE 212), Biological Kinetics and Bioreactor Design (BE 410/610) and Heat and Mass Transport in Biosystems Engineering (BE 412/612) courses in the BE curriculum. Her research focuses on the sustainable production of biofuels, primarily hydrogen gas, from waste agricultural feedstocks, and on carbon capture/high-value product formation by freshwater algal cultures. She leads the Biosystems Technology educational program developed for secondary students enrolled in agriculture courses in South Carolina.

Dr. Charles V. Privette III is an assistant professor with his professional engineering licensure in South Carolina. He provides instruction on innovative engineering design for water quality/quantity issues as related to storm-water runoff and erosion control. Current research projects include: real-time monitoring of road construction on the Foothills Parkway for water quality, modeling urban growth and its impacts on both water quantity and quality, and remote sensing of surface soil moisture using reflected satellite signals.

Dr. Terry Walker is a professor with more than 15 years of experience in bioprocess engineering research and design. His research emphasizes sustainable engineering for integrated bioprocessing of feedstock materials to bioenergy and high-value components. He currently leads the Clemson Sustainable Biofuels Pilot Plant with research associate David Thornton. With help from creative inquiry and graduate students, the pilot plant converts all campus waste cooking oils to biodiesel that will displace more than 20% of the fossil-based diesel used in campus fleet vehicles. He authored over 30 peer-reviewed research articles and a biofuels textbook entitled Biofuels Process Engineering Technology (McGraw-Hill, 2008) with co-author **Dr. Caye Drapcho**.

Dr. Tom Owino is an Associate Professor. His research interests are water quality, irrigation and drainage, and horticultural engineering.

EEES Welcomes Dr. Shuller-Nickles

Dr. Lindsay C. Shuller-Nickles joined EEES as an Assistant Professor this Fall. **Dr. Shuller-Nickles** received her PhD in Materials Science and Engineering at the University of Michigan in 2010. She also spent time working in the Glenn T. Seaborg Institute at Lawrence Livermore National Laboratory (summer 2005) and in Civil Engineering and Geological Sciences at University of Notre Dame (intermittently 2007-2010). **Lindsay** continued working at University of Michigan as a Postdoctoral Research Fellow in Geological Sciences until becoming an Assistant Professor. She participates in the Nuclear Environmental Engineering program, which is a unique program at EEES that combines radiochemistry with environmental chemistry. **Lindsay's** research integrates computational and experimental techniques to better understand the thermodynamic stability and kinetics that control the behavior of radionuclides in the environment. A primary focus is to understand the immobilization of radionuclides in the environment via sorption onto mineral surfaces, incorporation into rock-forming or uranyl minerals, or precipitation as solid phases. **Lindsay** says "In my free time, I enjoy spending time my husband and dogs, hiking, and doing yoga."

Dr. Minory Nammouz joined EEES as a Lecturer this fall. **Dr. Nammouz** received her PhD in curriculum and instruction at Clemson University in 2005. She came back to Clemson University in 2009 and worked as a post-doctoral research fellow in chemical education. **Minory** is designing and teaching physical science courses for elementary education majors that emphasizes the interconnections among the various science disciplines. **Dr. Nammouz** primary research interest is in understanding how students learn.

In her free time **Dr. Nammouz** likes to spend time with her husband and three children.

Margaret Thompson, J.D., Lecturer, Environmental Science, Law, and Policy, attended a special evening event in April, 2011, at The University of Michigan Law School, honoring Joseph L. Sax. Often referenced as "The Father of Environmental Law," Joe Sax taught at Michigan from 1966 to 1986, before joining the faculty at the University of California (Boalt Hall) where he is now an emeritus professor.

Dr. Brian Powell and Yuji Arai were awarded a subcontract from Savannah River Nuclear Solutions to examine technetium reduction in saltstone formulations.

Dr. Ron Falta, together with Gerald Blount and Alvin Siddall from the Savannah River Site, have received a United States Patent for a new method of capturing carbon dioxide during the manufacturing of cement. The patent, titled "Carbon Dioxide Capture from a Cement Manufacturing Process", involves the use of a two-stage calcining unit, with a low temperature (900 C) unit and a high temperature (1400 C) unit. The low temperature calciner converts limestone and dolomite into calcium and magnesium oxides, and produces pure carbon dioxide as a waste product. This carbon dioxide can be sold, or stored in deep geologic formations. Some of the resulting calcium oxide from the process can then be used in a continuous open loop to react with carbon dioxide in the calciner flue gas to form calcium carbonate, which is recycled in the low temperature unit. The cement components leaving the low temperature unit are combined in a high temperature (1400 C) calciner to form the cement clinker, which is then milled into cement.

This new design differs from the conventional cement making process, where all the feed minerals are heated together in a single high temperature calciner, and the carbon dioxide produced from the calcining process is mixed with the flue gases and discharged to the atmosphere.

World cement production is nearly 3 billion tons per year, releasing approximately 2.7 billion tons of carbon dioxide to the atmosphere. This is almost 10% of the annual worldwide total emission of carbon dioxide.

Dr. Kevin Finneran presented two invited talks at the Society for Industrial Microbiology (SIM) Conference in New Orleans, LA; the talks were entitled:
"Mixed Biological and Abiotic Reactions that Degrade RDX and Insensitive Munitions (IM)" and "Increasing Hydrogen and Butanol Production, and Xylose Utilization, in Clostridium beijerinckii using Extracellular Quinones/Hydroquinones"

Congratulations to Dr. Brian Powell and Dr. Mark Schlautman

They have been selected to lead a 3-year $1M project funded by the DOE Nuclear Energy University Partnership. Dr. Linfeng Rao of Lawrence Berkeley National Laboratory and Dr. Heino Nitsche of University of California-Berkeley will collaborate on the project. Clemson will use 50% of the funds and LBL and UC-Berkeley will share the other 50%. The project is titled "Quantification of cation sorption to engineered barrier materials under extreme conditions" and will focus on quantifying interactions of risk driving radionuclides with engineered barrier materials used in radioactive waste repositories. Studies will be conducted under the high temperature and high ionic strength conditions expected within the repositories.

Dr. Tanju Karanfil visited Beijing, China during May 24-30 to give an invited talk at the International Workshops on Endocrine Disrupting Compounds, Pharmaceuticals, Personal Care Products and Disinfection By-Products organized by VEOLIA and Tsinghua University. (Right)

He gave a talk at the School of Environmental in Tsinghua University. (Left and Bottom)

Dr. Karanfil also visited Great Wall, Summer Palace, Tianamen Square and Forbidden City during his trip. **Miao Yu** (MS, EE&S), EEES graduate student, was **Dr. Karanfil's** guide during the trip. **Miao** also attended the workshop.

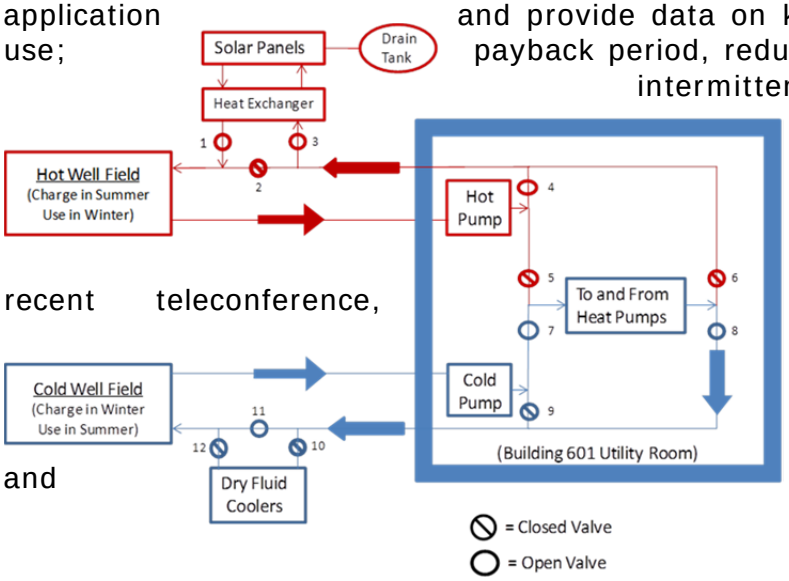
Dr. Stephen Moysey, alumnus Dan Matz (MS, EE&S, 2010) and collaborators from India were honored with a "Best of SAGEEP" award for their paper "Integrating hydrology and geophysics to evaluate the impact of artificial recharge on groundwater in rural India" presented at the 2011 Symposium on Applications of Geophysics to Engineering and Environmental Problems held in Charleston last spring. As part of the award **Dr**. **Moysey** will give the presentation at the European Association of Geoscientists & Engineers meeting in Leicester, England this September.

Dr. Brian Powell was selected to augment the USEPA Scientific Advisory Board, Radiation Safety Committee for a technical review of post-closure operations of uranium in-situ leach/in-situ mining operations.

Subsurface Thermal Energy Storage (STES) for Improved Heating and Air Conditioning Efficiency

By Dr. Ronald W. Falta and Dr. Fred J. Molz, EE&ES, Clemson University
With Subcontractors Charles Newell, GSI Environmental and Greg Tinkler, RLB Engineers

The research/demonstration team listed above recently received final approval from the U.S. Department of Defense (DoD) to begin data gathering, final design and construction of a ground-coupled (Geothermal) heat pump system with Subsurface Thermal Energy Storage (STES) for the 24,000 sq. ft. Headquarters Building at the Marine Corps Air Station in Beaufort, SC. The STES geothermal heat pump system that we are demonstrating differs from the conventional, single ground-loop, geothermal heat pump operation, because we take advantage of free or inexpensive sources of heat and cold to create two ground loops (borehole arrays serving as heat exchangers), one artificially hot and the other artificially cold, as illustrated in the Figure (Bottom). In contrast, a conventional geothermal heat pump system takes heat from or rejects heat to a single ground loop in both the winter and summer cycles. With this application, heat pump efficiency can be degraded due to net heating or cooling of the subsurface, adding an extra and often unexpected expense. Thus, what is good for heating is not good for cooling, and vice versa. By using a hot water source in the summer and a cold water source in the winter to maintain the hot and cold ground loops, respectively, the STES geothermal system can achieve a higher heating and cooling efficiency than the conventional system. Then, net heating of the hot loop and net cooling of the cold loop becomes beneficial. The field demonstration will provide a proof of concept for a STES application and provide data on key metrics, such as reduced energy use; payback period, reduced carbon footprint, ability to utilize intermittent energy sources/sinks and other factors. Typical academic research projects often result in the development of designs and prototypes, but usually not fully functioning systems. During a recent teleconference, we were telling the engineers that educators aren't worried that much by mistakes – we just erase them. Greg Tinkler said, "I do exactly the same thing, but I use a bulldozer, people get mad." and



Dr. Tom J. Temples (MS Geology, 1976 and Adjunct Associate Professor) assumed the position of President-Elect of the American Association of Petroleum Geologists (AAPG) Division of Environmental Geosciences (DEG) on July 1, 2011. In July 0f 2012 he will assume the position of President for a 1 year term. **Dr. Temples** has been a member of the AAPG since 1978 and is charter member of DEG when the division was formed in 1992.

Jeff Atteberry (MS, Hydrogeology, 2005) has been promoted to District Geologist in the Rockies by Chesapeake Energy Corporation, Oklahoma City. He is looking forward to doing more mapping and prospecting for oil and gas.

NEW JOBS FOR RECENT GRADUATES:

After graduation **Brittany Heisler** (MS, Hydrogeology, 2011) will be moving to Amherst, Massachusetts, and starting her career.

"I've certainly enjoyed my time here in Clemson, but it's time to move on". In June **Chris Patterson** (MS, Hydrogeology, 2011) started working at the Illinois State Geological Survey in Champaign, IL as a Research Specialist. He is working on monitoring, verification, and accounting (MVA) of large-scale CO^2 injection operations. "It's an exciting field, at least to some, and I'm happy to have landed a job before graduation."

Christina Anderson (MS, EE&S, 2011) is working as an environmental engineer at ARCADIS in Newport News, VA. She will officially graduate in December 2011.

Fei Chen (M.S EE&S 2008. PhD, EE&S 2011) finished his final defense on June 13th and will move with his family to Berkeley, California in July to work as a postdoc at Lawrence Berkeley National Lab.

Laura Simpkins (MS, EE&S, 2011)has accepted a position at Rogers & Callcott Engineers in Greenville as an Environmental Scientist.

Recent graduate **John Kroon** (MS, Hydrogeology, 2011) began employment as Associate Geologist with Chesapeake Energy Corporation in Oklahoma City. John will be presenting research results from his thesis, "Biomarkers in the Lower Huron Shale (Upper Devonian) as Indicators of Organic Matter Source, Depositional Environment, and Thermal Maturity," at the American Association of Petroleum Geologists (AAPG) Meeting in Washington, DC in late September. **John** received an award last year from AAPG in support of his thesis research.

While in Denver, **Dr. Cindy Lee** had lunch with **Matt Findley** (MS, EE&S, 1996) at the Brown Palace Hotel in Denver. **Matt**, who worked with **Drs. Bob Fjeld** and Steve Serkiz while at Clemson, is working with DCP Midstream Denver, CO and living in Boulder, CO.

Welcome Owen Vale, son of **Trevor Zimmerman** (MS, Hydrogeology 2010), was born Monday July 25th. He was 8lbs 1oz and 20.5 in long.

*Ezra Hughes son of **Laura Hughes** (PhD, EE&S, 2006) says it all!*

Hem Joshi (PhD, BE, 2011) recognized as Clemson Outstanding Graduate Researcher. Hem a PhD graduate student in biosystems engineering was selected by the Graduate Fellowship Committee as a Clemson University Outstanding Graduate Researcher. Outstanding Graduate

Researchers receive a $1,000 award. Hem's research interests include the optimization and characterization of biodiesel production from various feed-stock's and authored 7 peer-reviewed articles since 2008. He is a former recipient of the Wade Stackhouse Fellowship. Hem received both MS and PhD degrees in biosystems engineering from Clemson University.

*The next issue will be published in **January 27, 2012**. Please send your submissions for your activities during fall to Jan Young (ej@clemson.edu) latest by **January 20, 2012**. (Please do not forget to take pictures).*

THANK YOU!