Issue 6

Spring 2009

Geology Newsletter

Virginia Board For Geology

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In the Geosciences, Business is Booming

Geologist Amy Simonson loves her work. She spends her days in the countryside of Charlottesville, Virginia, measuring stream flow and groundwater levels for the state's Department of Environmental Quality. The job, she says, is exactly what she wanted.

Simonson, 25, began her job hunt in 2007 after getting her master's degree in geology from the University of Delaware, Newark. She had one condition: She wanted to spend as much time as possible in the field, not in front of a microscope or a computer. Taking a scattershot approach, she applied for jobs in geophysics, engineering, environmental consulting, and geographic information system mapping. She didn't have to wait long. "I got offered a lot of stuff," she says.

Simonson's experience isn't rare. For many young geoscientists now embarking on careers, the job outlook is very good. The current federal research funding situation means it's less rosy for those on an academic research track. But for those in industry, the number of geoscience jobs will grow by 22% from 2006 to 2016, much faster than the projected total of a 10% increase for all occupations, according to the U.S. Bureau of Labor Statistics.

"In general, the market is hot," says Cindy Matrinez, who analyzes geoscience workforce issues at the American Geological Institute (AGI) in Alexandria, Virginia. "Functionally, there's no unemployment of geoscientists right now."

In the petroleum, mining, and environmental consulting industries, a desperate quest for new talent has sent companies scrambling to hire new graduates. Traditionally, a master's has been the professional degree of choice for industry employers. But

the need for new hires within these fields is such that even graduates with bachelor's degrees are finding jobs, particularly in environmental consulting—although a master's is generally needed to move up the ladder from field-work to the office.

That intense competition for new hires has raised starting salaries in these industries, especially oil: Graduates now entering the petroleum industry earn $82,500 a year, on average , according to AGI.

Geoscience salaries generally have also been increasing, AGI data show. In 2005, the average starting salary for a geoscientist in an industry, academic or government position, was $74,000, a 9.7% increase over 2004. For later career scientists with more than 20 years of experience, the average salary was $139,000 in 2005, an increase of more than 23% over the previous year.

The current hiring boom in the petroleum industry is a welcome change from the layoffs of the 1980s and 1990s; unemployment among geoscientists reached 11% in 1985. Those layoffs left a distinct gap in the oil industry workforce between new hires and senior managers, a 2007 National Petroleum Council report noted.

In the Geosciences, Business is Booming *(cont'd)*

And with many senior managers likely to retire within the next decade, there aren't enough midlevel managers ready to take the helm. This hiring and firing pattern is "totally critical," Martinez says. "The industry needs to work on fixing that."

Although industry jobs are readily available, the job market is tougher for students seeking careers in academia. One problem is a research-funding shortage, as primary funding sources such as the National Science Foundation have suffered from essentially flat research budgets for the past few years. That lack of research money contributes to another trend: When a venerated geology professor retires, some universities are choosing not to hire a replacement, filling the position with a scientist in a different, often environmental, field, or not at all. As of January 2008, the number of geoscience faculty members in U.S. colleges and universities was 12,354, down from 13,554 in 1999, according to a June 2008 report released by AGI.

The lack of available academic positions has left geoscientists who aspire to faculty jobs in limbo, often stringing together several post-doc positions as they wait for openings, Martinez says. The percentage of geoscience post-docs "has really gone through the roof," with about 58% Ph.D. graduates pursuing post-docs in 2005 compared with 40% in 1999. That trend may soon slow if a combination of strong industry salaries and weak academic opportunities pushed some students to leave graduate school early. "We're seeing geoscientists in droves going into industry with master's degrees and not staying on for Ph.D.s," Martinez says.

"My perception is indeed that there are many more applicants for jobs than there are positions," says Joseph Colgan, a Mendenhall Postdoctoral Research Fellow at the U.S. Geological Survey (USGS) in Menlo Park, California. Colgan, who studies the geologic setting of mineral deposits in the western United States, has considered academic jobs at USGS. However, the agency, like many universities, has tightened its belt after years of flat or declining budgets, which means fewer hires.

Geoscience graduates will have training that qualifies them for jobs outside of their home field. Scientists with training in multi-disciplinary specialties such as isotopic tracers, mineral commodities, and geotechnology are successfully venturing into fields that aren't considered geologic, including medicine, law, and finance. In fact, only 50% of people with geoscience degrees currently work in the geosciences, according to AGI.

Ultimately, for geoscientists who want to work in industry, job opportunities abound. "The earth sciences are in a somewhat unique situation at the moment because we're in one of the biggest commodity booms ever," Colgan says. So if he doesn't get a permanent position with USGS, he adds, "I'll come up with something else."■

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http://sciencecareers.sciencemag.org/career_magazine/previous_issues/articles/2008_08_08/caredit.a0800118

Hydrogeologists Tap Into Demand for an Irreplaceable Resource

When hydrogeologists talk about their field, one word keeps coming up: "recession-proof." While geologists in the energy and mineral industries face roller-coaster hiring-and-firing cycles, those who study the movement and chemistry of water seeping through rocks and sediment find demand for their expertise almost as steady as the flow of groundwater itself.

"I can't think of any unemployed hydrogeologists," says Roy Haggerty , an associate professor of hydrogeology at Oregon State University , Corvallis. It's easy to see why. Water is essential, irreplaceable, and, as populations and economies grow, increasingly in demand and endangered.

Environmental consulting companies, which employ about 80% of hydrogeologists in the United States, currently report four jobs for every qualified graduate, according to the American Geological Institute (AGI). Government regulatory agencies, national laboratories, and mining and

Hydrogeologists Tap Into Demand for an Irreplaceable Resource *(cont'd)*

oil companies also need them. New niches open regularly as hydrogeologists team up with scientists in other disciplines to grapple with huge environmental challenges, such as forecasting how changing climate will affect water resources and aquatic life. And signs are that the future will hold more of the same. As Richelle Allen-King , a hydrogeology professor at the University at Buffalo in New York, puts it, "Water problems are not going away."

Kurt Zeiler, 32, works in the Denver, Colorado, office of the global environmental-services company AMEC Geomatrix . After 5 years as a hydrogeologist, he says: "It's going well. I definitely love this field. There's a lot of opportunities to do really interesting science."

Zeiler's training--a B.S. in earth science from Montana State University in Bozeman and a double-M.S. in water resources and hydrogeology from the University of Wisconsin , Madison--exposed him to the whole gamut of hydrogeologic work. He learned to monitor the water levels in wells for the differences in hydraulic potential ("head") that drive water through porous rock or sediments, analyze well-drilling cores to get a picture of underground rock and sediment layers, perform pump tests to determine how readily the water can flow through the strata, and probe water samples for their geochemistry and contamination.

Taking data. Kurt Zeiler logs core samples.

His forte, though, is running the computer models that hydrogeologists use to integrate their knowledge of a groundwater system and plan its future. Zeiler's modeling work has covered sites in California, Montana, Alaska, and Ghana. His biggest project is an aquifer east of Los Angeles where groundwater contaminated with fuel and industrial solvents is being pumped out and treated for use as drinking water. Zeiler says he leaves most of the data gathering to other scientists. "I enjoy being outside--working on a drill rig, getting my hands dirty, all that stuff," he says. "But modeling is where I've ended up."

Of the 15 hydrogeologists in the Denver office where Zeiler works, only three have Ph.D.s. That's typical of the field as a whole: AGI estimates that university programs graduate five times as many M.S. students as Ph.D.s. Its figures show that about 18,000 hydrologists and hydrogeologists now work in the environmental industry, a few thousand in the mining and petroleum industries, and about 850 in academia, the only sector for which a doctorate is required.

Despite high demand, salaries for hydrogeologists in government and in the private sector remain about 15% to 20% below those of other geoscientists. Low payoffs go hand in hand with high security, Haggerty says: "I know of people in their 50s who have been fabulously successful in the petroleum industry, but there are boom-and-bust cycles. In hydrogeology, the boom and bust is not there. It's much more level. But I don't know of many multimillionaire hydrogeologists, either."

If the field doesn't surge, it does at least ebb and flow. "Ten to 20 years ago, it was all cleanup--contaminant work," Allen-King says. The profession's cleanup phase waned in the late 1990s and early 2000s as changing political priorities, soaring cleanup costs, and some noteworthy environmental successes led to cutbacks in remediation.

Now, the focus has shifted to supply, the problem of finding and managing water resources while protecting their quality. Techniques such as artificial recharge (reinjecting water into the ground for storage) and carbon sequestration (keeping carbon dioxide emissions from combustion out of the atmosphere by forcing them underground) raise new water-related environmental issues that scientists are just learning to tackle.

In the realm of research, academic hydrogeologists are broadening their time horizons to help forecast and mitigate the effects of climate change, and they're stretching the traditional boundaries of their field to explore questions such as how groundwater interacts with the surface water of lakes and rivers. Collaborations with scientists from other disciplines are proliferating. "More and more, hydrogeologists are no longer working alone," says John Wilson, a hydrology professor at the New Mexico Institute of Mining and Technology in Socorro. "The subsurface is part of it but no longer the whole thing. Other parts of the cycle--biology, chemistry, ecology, and climate--that is where research is going, I think."

The broadening of academic research has filtered down to the training of M.S. students. Some graduate programs, such as New Mexico Tech's and the double-M.S. pro-

Hydrogeologists Tap Into Demand for an Irreplaceable Resource *(cont'd)*

gram at the University of Wisconsin, now require interdisciplinary courses in topics such as surface water, ecology, and economics. Some hydrologic consulting companies, however, complain that versatility isn't what they need. "We're having difficulty finding traditional hydrogeologists," says Daniel Stephens , founder and head of a 110-employee environmental consulting company with offices in New Mexico, Texas, and California. "The people we're seeing are fewer in number, and their qualifications are thinner." Instead of giving students a smorgasbord of skills, Stephens says, universities should equip them to start work on real projects.

But Wilson, whose department at New Mexico Tech embraced the multidisciplinary approach a decade ago, says his students are well-prepared to learn anything they need to know. "At some point, the employer is responsible for training students in the details of the jobs," he says. Oil companies, he notes, are happy to recruit promising hydrogeologists and train them in petroleum exploration.

If money were the only lure for earth scientists, fossil fuels might be the only fluids in town. But hydrogeologists say a strong undercurrent of environmental idealism pervades the field as well. Just as many senior scientists drew their inspiration from the first Earth Day, some young water experts are pursuing activist agendas of their own--and carving out new career paths to do it.

Trayle Kulshan is one of them. After getting her M.S. in hydrogeology from Stanford University in Palo Alto, California, in 2002, she spent 2 years in the Peace Corps in Guinea. Now, as water, sanitation, and hygiene coordinator for the humanitarian nongovernmental organization Action Contre la Faim (Action Against Hunger), she plans and oversees projects to build wells, latrines, and water networks in developing countries as far-flung as Afghanistan and the Democratic Republic of the Congo. She currently is working in Kenya.

"Water problems are not going away." -Richelle Allen-King, University at Buffalo

Although she is now as much a public-health worker as an earth scientist, Kulshan says her graduate training gives her a quick grasp of hydrologic conditions as well as skill in collecting, analyzing, and interpreting other kinds of data and communicating the results. "In grad school, we are all [teaching assistants] and develop skills as teachers. Every day I am teaching," she wrote by e-mail from Nairobi. "And I have to say I am still a student learning every day as well."■

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http://sciencecareers.sciencemag.org/career_magazine/previous_issues/articles/2008_08_08/caredit.a0800120

Prof. Bruce Goodwin Chaired Geology Dept.

Bruce Kesseli Goodwin, 76, professor emeritus of Geology at the College of William & Mary, died peacefully, surrounded by his loving family, on Friday, September 5.

He was born on Oct. 14, 1931, in Providence, R.I., the son of Thomas William and Lizetta Kesseli Goodwin. He grew up in Warwick, R.I., spending many happy hours sailing and fishing on Narragansett Bay.

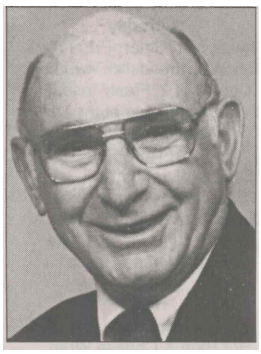
He graduated from Aldrich High School in 1949 and received a bachelor of science from the University of Pennsylvania in 1953. After serving in the Army for two years, he attended Lehigh University where he earned a doctorate in geology in 1959.

He joined the faculty of the University of Pennsylvania, teaching geology for four years. In 1963, he relocated to Williamsburg, where he became a founding father of the geology department at the College of William & Mary. During his 33-year tenure at W&M, Professor Goodwin chaired the geology department for 17 years and conducted extensive research in the Piedmont region specializing in structural geology and petrology of metamorphic and igneous terrains.

He was honored as a fellow of the Geological Society of America and served in various offices if scientific societies. He was instrumental in establishing the long-term relationship between W&M and the Richmond Math and Science Center.

During 1982-83, he initiated the establishment of the Virginia Board for Geology, was the first certified geologist in the state, and was the first chair for the State Board for Geology. He actively supported the Virginia Academy of Sciences, was president of the Geology Section several times, and guided many students toward their first scientific presentations. He was awarded 11 grants from the National Science Foundation to support students in undergraduate research.

Professor Goodwin's first love was teaching, and he established a distinguished reputation for his interesting, informative, and challenging courses. The college recognized his excellence in teaching by awarding him the Thomas Jefferson Teaching Award in 1971.■



Excerpt taken from Professor Goodwin's obituary

Lead-Based Paint Abatement and Site Remediation

Can a Virginia Certified Geologist perform an Environmental Site Assessment (ESA) where lead-based paint has caused a lead hazard without also possessing a Virginia lead inspector license or lead risk assessor license?

Virginia's Lead-Based Paint Activities Regulations apply only to housing build before 1978 (target housing) and child-occupied facilities (day care, elementary schools, etc.); and only to work intended to permanently eliminate lead-based paint hazards. Inspection of these properties in support of permanent lead-based paint hazard elimination must be performed by a Virginia licensed lead inspector or lead risk assessor.

No lead license is required to perform ESAs on property that is not target housing or a child-occupied facility.

Virginia's Lead-Based Paint Activities Regulations (18VAC15-30-550 B 7 and 8) set standards for sampling soil along target housing drip lines that may be useful to Geologists. (http://leg1.state.va.us/cgi-bin/legp504.exe?000+reg+18VAC15-30-550)

The Lead-Based Paint Activities Regulations may be found at: http://www.dpor.virginia.gov/dporweb/lead_base_paint_regs.pdf. Or you may call 804 .367.8595 or e-mail at alhi@dpor.virginia.gov for more information.

Earth Science Positions Available in Chesterfield County Public Schools

The mission of the Personnel Department is to hire and retain, at all levels, the most highly qualified and competent employees who represent positive role models for an increasingly diverse student population; who meet the high expectations of the school district; and who strive to be lifelong learners. The mission will be accomplished through vigorous recruitment, support, and retention efforts, including effective orientation, guidance, training, and professional growth opportunities.

For more information contact:
Chesterfield County Public Schools
Human Resources Department
Personnel Department

P.O. Box 10
Chesterfield, VA 23832
Telephone (804) 748-1984
FAX (804) 768-1085
TDD (804) 748-1638

You can view all available positions by visiting the Schools website at: *http://www.chesterfield.k12.va.us/CCPS/human_resources/job_main.htm*

Article submitted by William S. Hastings, Jr.

The Coles Hill Uranium Deposit

HISTORY AND BACKGROUND

A large uranium deposit was discovered in 1978 in Pittsylvania County, Virginia at Coles Hill (see Figure 1). The deposit is in hard rock at the edge of a Triassic basin. Based on an exploration concept put forth by Norm Reynolds, current President and CEO of Virginia Uranium as well as the former President of Marline Uranium, geologists were traveling a roundabout road to get from one part of the basin to another. The geologist had their vehicle-mounted scintillometer running when they drove over the surface exposure of the ore body just west of the basin boundary. Extensive drilling through 1983 delineated a resource of about 110 million pounds of U_3O_8 as estimated by Pincock, Allen and Holt (1982) as well as later confirmed by the largest uranium mining company of its day, Union Carbide. Due to a perceived difference between uranium and other kinds of mining, the Commonwealth of Virginia introduced a moratorium (meaning delay) that required the development of additional regulations specific to uranium mining before any agency of the Commonwealth could accept a permit for uranium mining. However, regulations for uranium exploration were approved and passed.

(Coles Hill continued on Page 6)

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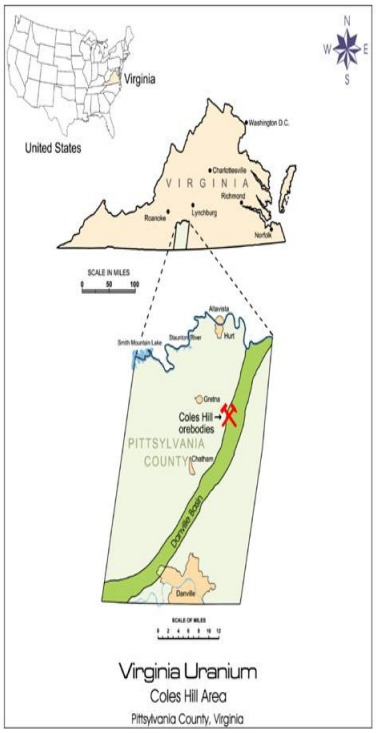

Figure 1. Location of the Coles Hill uranium deposit.

The project contained sufficient "historic reserve" estimates for the Commonwealth of Virginia to hold hearings and established the Uranium Administration Group ("UAG"), charged with examination of uranium development at Coles Hill. In 1985, the UAG recommended "… that the moratorium on uranium development can be lifted…" with an overwhelming sixteen members supporting the recommendation and only two dissents. The moratorium was not lifted because specific legislation was not introduced due to the drop in uranium prices that eliminated the economic viability of any venture trying to mine uranium in Virginia. Leased mineral rights were eventually returned to the land owners.

In 2005, with the price of uranium beginning to soar, interest in the deposit began to grow again. In 2007, the Coles and Bowen families, who for generations lived on or near the Coles Hill deposit and wanted to see this deposit developed correctly, formed a company called Virginia Uranium, Inc. The company initiated a uranium exploration program to verify the historic data as well as learn more about this deposit.

By March 2008 Virginia Uranium, Inc. completed their drilling program and in June 2008 issued a National Instrument 43-101 (NI 43-101) report detailing the deposit. The NI 43-101 is required by the Canadian Securities Administrators and amounts to an independent technical audit of the resource. The NI 43-101 uses the most modern modeling techniques to bring the estimated resource figures to the current world standard. The report was subsequently updated in February 2009 and increased the resources size to 119 million pounds of U_3O_8.

The development of the Coles Hill uranium deposit would be a tremendous economic benefit to Southside Virginia. Based on the current resource estimate the deposit is potentially worth $8-10 billion dollars. Virginia Uranium estimates that 300-500 direct employees would be needed for the mining and milling operations.

In November 2008, the Virginia Coal and Energy Commission created a Uranium Mining Sub-Committee to evaluate uranium mining. The Sub-Committee is expected to engage the National Academy of Sciences to undertake a study with an anticipated duration of one to two years. The Virginia Coal and Energy Commission will make a recommendation to the legislature based on the outcome of the study. Virginia has a bicameral legislature so bills enabling uranium mining regulation development must be approved by both the House and the Senate. The Governor must then sign the bill for it to become enacted into law.

REGIONAL GEOLOGICAL SETTING

The regional geologic setting of the Coles Hill uranium deposit is derived from Jerden (2001) and Henika's *Geologic Map of the Virginia Portion of the Danville 30 by 60 Minute Quadrangle* (2002). The project area is situated along the northwestern margin of the Chatham Fault Zone, which separates the Danville Triassic Basin (Mesozoic Basin) on the east from structurally deformed and metamorphosed crystalline rocks of the Piedmont physiographic province to the

(Continued on Page 7)

(Continued from Page 6)
west. The Coles Hill uranium deposit is hosted in mylonitic quartzo-feldspathic gneiss of the Leatherwood Granite (440 Ma, Kish et al., 1979), part of the Martinsville Intrusive Suite. In general, gneisses and mica schists of the Fork

Mountain Formation and Martinsville Intrusive Suite are mapped as part of the Smith River Allochthon (475 Ma), a thrust-faulted nappe which has transported these formations from their place of origin (Conley and Henika, 1973).

DEPOSIT TYPE AND EXPLORATION CONCEPT

The Coles Hill uranium deposit is a fracture-hosted hydrothermal deposit, with uranium situated in mylonite. Hydrothermal solutions and associated uranium mineralization are presently hypothesized to have been mobilized by the tectonic events.

The mechanism of uranium deposition at Coles Hill is similar to that in the Athabasca Basin, as indicated by the presence of alteration minerals hematite, epidote, and chlorite. A similar deposition mechanism in the Athabasca Basin has produced significant-grade uranium mineralization, which might also occur in the untested deeper parts of the Coles Hill Deposits (Jerden 2001). The uranium mineralization is in chemical equilibrium within the mylonite.

HOST ROCK AND MINERALIZATION

Uranium mineralization in the Cole Hill uranium deposit is hosted by three separate textural rock types. These three textural types are: (a) hematitic and mylonitic Leatherwood Granite, (b) hematitic amphibolite intrusive into Leatherwood Granite, and (c) densely fracture-filled Leatherwood Granite. All of the hosted rock types are found west of the Chatham Fault Zone.

At Coles Hill, one of the host rocks is mylonitized orthogneiss with depleted quartz and structurally controlled Na-metasomatism as albitization along the Chatham fault zone. Uranium is associated with hydrothermally filled fractures and veinlets as rims on and/or rimmed by apatite, chlorite, barite, titanium oxide, hematite, calcite, and pyrite.

About Virginia Uranium Inc.: Virginia Uranium Inc. is a Virginia corporation established in 2007 by the Coles and Bowen families to begin preliminary work on the development of one of the largest undeveloped uranium deposit in the United States, which is located at Coles Hill in Pittsylvania County, Virginia. For more information, please visit www.VirginiaUranium.com.

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Change of Address? Be sure to notify the Board office in writing!

It is a Virginia certified professional geologist's responsibility to inform the Board of a change of address. Not receiving a renewal notice does not remove the responsibility of renewal from the regulant.

Returning from Active Duty Military Service?

If your Virginia Certified Geologist certificate expired during your service outside of the United States, you have 60 days from the date of your release from Active Duty to renew your certificate without any penalty. To qualify, please send a copy of your DD-214 or other appropriate documentation to verify your active duty status to the Board for Geology at DPOR.

2009 Meetings of the Geology Board

2009

January 7, 2009, Board Room 3

April 14, 2009, Board Room 3

July 14, 2009, Board Room 3

October 14, 2009, Board Room 3

Meeting Location:

9960 Mayland Drive, Suite 200, Richmond, VA 23233