

Kentucky Cross Section

Earth Resources—Our Common Wealth

Spring 2012

Water Resources Section Head Jim Dinger retires after three decades with KGS

When asked about the accomplishments of the KGS Water Resources Section since he arrived in June 1981, Jim Dinger points to the fact that 55 people have worked in the section during his three decades at the Survey. “I think we trained people to work in a real-world situation and take real-world measurements rather than doing things with calculations that you get in a textbook,” says Dinger, who retired as section head in April. “You don’t always have all the data; you *sel-dom* have all the data to fit the textbook situation.”

Dinger says there were very few degreed hydrogeologists in Kentucky when he arrived at the Survey from the University of Alabama at Birmingham; most of them worked

for the Survey at the time. But he adds that there has been a growing recognition of the importance of groundwater in the state.

For his first decade, Dinger, who has a Ph.D. in hydrology from the University of Nevada–Reno, worked on groundwater systems in Kentucky’s coal fields, especially in eastern Kentucky. The next decade focused more on agriculture issues. “We monitored nine farms around the state for almost 8 years, each in a different hydrogeologic setting or in a different crop situation,” he says. The work defined what contaminants were getting into groundwater and how they were getting there.

The last 10 years, he says, were marked by increased community interest in groundwater for drinking-water supplies, and in issues related to karst systems. All of these priorities, he adds, have been driven by the requirements of new environmental legislation. Dinger points out that research done by Water Resources Section staff in the past 30 years has meant that the groundwater flow systems

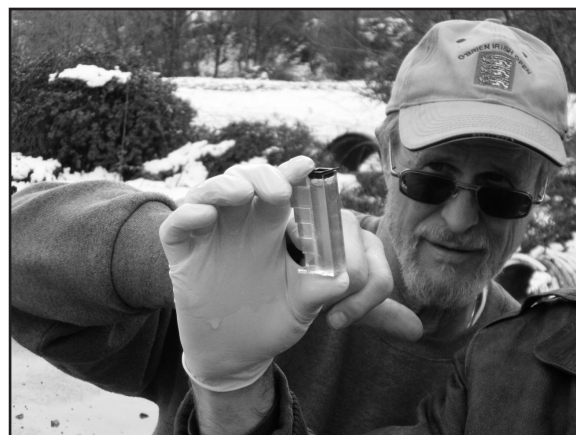
have been determined for each of the physiographic provinces of the state.

Working with State legislators on three important issues

was also gratifying for Dinger. The issues were the

original geologist registration bill, creation of the groundwater data repository, and certification requirements for water-well drillers. The effects of this legislation, he adds, will extend well into the future. He adds that interaction with University of Kentucky faculty and more than 30 graduate students was one of the “greatest pleasures” of his KGS career.

Last year, the Kentucky Water Resources Research Institute recognized Dinger’s long career in water research



Jim Dinger looks at a water sample taken in one of many projects in which he and Water Resources Section staff were involved during his three decades with the Survey.

with the annual Bill Barfield Award for Water Research, presented at the Kentucky Water Resources Annual Symposium.

Dinger’s wife, Prince, also retired from her career in accounting in April. The two plan to enjoy the “geologic splendor of North America” via motorcycle and camping in their retirement. Dinger expects to spend time visiting his favorite region, the Rocky Mountains, but also hopes to continue enjoying the water—in a sailboat, one of his other great loves in life. ❖

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New law modifies Kentucky requirements for professional geologists

During its regular session earlier this year, the Kentucky General Assembly approved changes in the law regulating the geologic profession

in the state (Kentucky Revised Statute 322A). The bill was approved unanimously, with a Senate vote of 38-0 for it and a 97-0 vote of approval in

the House of Representatives. Gov. Steve Beshear signed the bill into law on April 11; it will take effect July 12. The

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Director's Desk

KGS recently held its 51st annual seminar, "The Nexus for Geologists in Kentucky." This seminar is one of the largest gatherings of geologists in Kentucky, so discussions about the geologic profession seemed timely in light of recent changes to the geologist registration law. Changes to KRS 322A that were passed earlier this year by the General Assembly and signed into law eliminated the exemption for State and local government workers employed as geologists, instituted a fine of up to \$1,000 for violations of KRS 322A, instituted biennial registration procedures, and allows the state geologist, a permanent member of the Board of Registration for Professional Geologists, to send a representative to board meetings when necessary. Eliminating the exemption for State and local government geologists is a big change. These geologists have 3 years to pass the National Association of State Boards of Geology exams on fundamentals and practical geology. Refresher courses are being planned. The outcome of these changes will be a stronger geologic profession in Kentucky and better qualified geology practitioners throughout the commonwealth.

The meeting also focused on Kentucky's geological societies and professional organizations. Representatives from these groups talked about their

programs, activities, and how to get involved. We are fortunate to have a number of these groups active in Kentucky. I am most familiar with the Kentucky Section of the American Institute of Professional Geologists, Kentucky Society of Professional Geologists, Kentucky Paleontological Society, Indiana-Kentucky Geological Society, and Ohio Valley Section of the Association of Engineering and Environmental Geologists. (The Eastern Section of the American Association of Petroleum Geologists and the Southeastern Section of the Geological Society of America are also important for Kentucky geologists, but their programs are set by national organizations, not at the state level.) These groups foster professionalism and provide continuing education, social interactions, and opportunities to be involved with other geologists. All of these things are important for geology professionals in Kentucky, and KGS attempts to assist them in their missions. My own experience in being involved with geological societies has always been worthwhile. I encourage all geologists to get involved and volunteer their time if they are not already doing so for the benefit of the geologic profession and their own careers. The health and vitality of these organizations is important to Kentucky and the Kentucky Geological Survey.

Also at the meeting, KGS geologists gave highlights of several ongoing



Jim Cobb

research projects, covering topics such as geologic map dissemination, videos in water wells, geologic hazards, cores from the Hancock County sequestration well, and groundwater monitoring of Cane Run.

The feedback that I received about the meeting was positive, and many appreciated our opening the meeting to outside speakers and including topics of interest to the greater geologic community in Kentucky. The KGS annual seminar seems to be a good event at which the 1,800 geologists registered with the Kentucky Board of Registration for Professional Geologists can get together to focus on issues relating to our profession. Thanks to all who participated. ❖

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legislation, Senate Bill 162, sponsored by Sen. Joe Bowen of Owensboro, provides new powers to the Board of Registration for Professional Geologists and repeals the registration exemption for persons employed as geologists in State and local governments.

Under the new law, the board will have the power to administer oaths, receive evidence, issue subpoenas, and conduct interviews as part of its duties to enforce its regulations and investigate complaints against geologists. The law also gives the board the power to levy fines up to \$1,000 per violation for fraud in obtaining a professional geologist license, negligence, incompetence, misconduct, and felony convictions. Changes also allow geologists to appeal board decisions in their local county circuit



resources community. While directing the laboratory, he was involved in numerous water-quality projects across Kentucky, both through partnerships with KWRRI and the Kentucky Watershed Watch. Francis has stayed active in such volunteer efforts after his retirement. ❖

(Photo courtesy Anna Hoover, KWRRI)

Retired KGS Laboratory Manager Henry Francis was presented the 2012 Bob Lauderdale Award for Water Quality at the annual meeting of the Kentucky Water Resources Research Institute this spring. The award, presented by KWRRI Director Lindell Ormsbee, recognized Francis's long service to the Kentucky water

KGS mapping highlighted in Esri publication

The spring 2012 edition of *ArcUser* magazine highlighted KGS's online mapping in a story about the Survey's move of its map information service from ArcIMS to ArcGIS for Server in 2011. Writer Matthew DeMeritt talked to Doug Curl of the KGS Geoscience Information Management Section. Curl, who develops and manages the KGS online mapping services, explained how changes are easier using browser-based maps than with paper maps.

The article, "Responsiveness and Reliability," also noted that the new service bypasses the need to import huge base-map data sets from State agencies: "By using streaming map services in ArcGIS for Server, KGS now can provide various basemap data via other Kentucky agencies' external published services and not have to worry about the design and maintenance of those layers, and it always has the most current version of the basemap without having to acquire and maintain the data. This allows KGS to focus on its own data."

The upgrade, the article noted, has resulted in more use of the map service, less downtime for the server, and a reduction in orders for paper maps. ❖

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Seth Carpenter joins the Geologic Hazards Section at KGS

by Liz Adams

When I sat down with Seth, I asked what first attracted him to the field of geology. He quickly reminisced about a cross-country road trip he took with a friend in 2001. He said they traveled to the Southwest, and he was intrigued by the sights of rocks being deformed, visible fault lines, and folds in the earth's crust. When this question was expanded to seismology, he responded that it was based partially on his physics and geophysics background—he has an M.S. in geophysics from Oregon State University and a B.S. in physics from Davidson College in his native North Carolina—and partially on his concern about the societal impact of natural disasters. The final factor, however, was the moment when he learned he could do his master's research in Nepal and Tibet with a research project locating and interpreting earthquake hypocenters in the area.

Seth came to the Survey from the Idaho National Laboratory, where he worked on their seismic monitoring program's seismic network. At KGS he is maintaining our own Kentucky Seismic and Strong-Motion Network. Once the network becomes self-sustaining, his own research on hazards and seismotectonics in Kentucky will begin. With a future filled with new research, Seth hit the ground running when he presented a poster on the process of predicting the magnitude of future earthquakes based



on field measurements and collection of fault data at our annual seminar on May 18. When asked about his research, Seth immediately began talking about new findings in seismology and how he is working on finding ways to improve the consistency of earthquake magnitude predictions. The main goal of his research is to create a new scale of parameters from which to make these predictions.

Throughout our conversation, it was quite evident that his happiest memories are associated with his wife and kids. He is the very proud father of four girls ranging in age from 8 months to 6 years. He met his wife of 9 years, Sally, while he was a teacher in Louisiana and coaching a high school's cross country and track

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court, not just in Franklin County. Out-of-state geologists registered in Kentucky must still file appeals in Franklin Circuit Court.

The registration exemption for geologists in State and local governments has been repealed. Effective July 1 of this year, employees in State and local government jobs performing geologic work will have until July 31, 2015, to become registered by passing the fundamentals and practice of geology tests developed by the National Association of State Boards of Geology and meet the education and experience requirements of KRS 322A. This change is seen as favoring the professional development and upward mobility of government geologists, because many supervisory positions require professional certification.

Two other provisions were included in the bill. The state geologist, a permanent member of the five-person Board of Registration, is allowed to designate someone to attend board meetings on his or her behalf. The registration renewal period is also changed to every two years from the current annual renewal. ❖



KGS Associate Director Jerry Weisenfluh (right) testifies before a House committee on March 27 about SB 162, as Board of Registration Chairman Larry Rhodes and bill sponsor Sen. Joe Bowen of Owensboro listen. The bill passed the legislature without dissent and was signed into law by Gov. Beshear on April 11.

European group visits Core Library during a Kentucky field trip

Twenty geologists, engineers, and other professionals from European oil and gas exploration companies and the Dutch national geological survey took a field trip to Kentucky in April, which included a stop at the KGS Well Sample and Core Library. The purpose of the visit was to expose the Dutch participants, who evaluate subsurface oil and gas potential of the North Sea Carboniferous, to analogs in similar rocks in eastern Kentucky. Kentucky has extensive roadcuts, providing unparalleled access to detailed characteristics of sandstone reservoir bodies and borehole data to place the outcrops in a three-dimensional perspective.

Dr. Huw Williams and Paul Davies, with Reservoir Geology Consultants Ltd. in Wales, led the trip, the result of 18 months of planning and development. Reservoir Geology Consultants has used data obtained from the KGS Web site to construct three-dimensional models of sandstone bodies using Petrel modeling software. The group visited the Core Library to view samples and hear a

background briefing on the geology of eastern Kentucky.

“Despite a couple of wet days, we had a great time and saw some great rocks,” Williams said of the trip. “Most importantly, the participants felt that they had an excellent field trip, and the topics and timing couldn’t have been better for the application of new ideas, mostly gained from Kentucky roadcuts and 3D sand-body maps made from the KGS coal borehole database, to the exploration and production of hydrocarbons in the southern North Sea.”

KGS Director Jim Cobb greeted the group when they arrived at the Core Library on April 18. He answered ques-



Steve Greb of the Energy and Minerals Section briefs the European group on the geology of eastern Kentucky before its field trip to outcrops and roadcuts in that region.

tions about the Survey and Kentucky. The Europeans received briefings about eastern Kentucky geology from Associate Director Jerry Weisenfluh, Steve Greb of the Energy and Minerals Section, and Core Library Manager Patrick Gooding. They spent the next several days visiting roadcuts and outcrops in eastern Kentucky. ❖

Reformatted annual seminar draws large crowd to Core Library

The May 18 KGS annual seminar changed format from past seminars, with breakout sessions, poster presentations, and an off-site field trip. It also attracted the largest crowd of participants in recent years. One hundred thirty-five people came to the seminar, titled “The Nexus for Geologists in Kentucky.”

KGS Director Jim Cobb began the seminar with a discussion on geological, paleontological, and other related societies in the state. He told the crowd that KGS would like to help revitalize the societies and draw new members into their ranks. Representatives from several of the societies also made presentations.

Three breakout sessions were held during the daylong seminar. Participants were able to choose from seven breakouts led by KGS staff. The topics included KGS online mapping, geologic hazards,

the ASBOG exam, and a field trip to the Cane Run watershed project. KGS researchers also made presentations on their projects during a morning poster session.

The changes in the State registration statutes enacted by the legislature and signed into law by Gov. Steve Beshear were discussed during the

traditional barbecue lunch. The changes will take effect in July. ❖



Bethany Overfield of the Geologic Mapping Section talks about a poster she and Dan Carey created on the geology of a state highway district.

Warren Anderson speaks at Irish symposium on pyrite problems

Trinity College in Dublin, Ireland, hosted a one-day conference on April 20 to address issues related to the use of construction fill containing pyrite, and Warren Anderson of the KGS Energy and Minerals Section was invited to speak about his research at the event.

“My talk discussed the problems of pyrite oxidation in black shale soils related to foundation engineering failures,” Anderson says. “We have substantial problems of this nature in east-central Kentucky in Estill and Powell Counties.” Pyrite in the shale oxidizes and forms sulfate minerals that swell, which causes heaving of foundation floors and walls, creating cracks and severing utility lines. Hospitals, schools, factories, water plants, homes, and roads have been affected by this, costing millions of dollars in repairs.

“One reason they wanted me to speak was because we have conducted research on this issue, and they wanted to show their professional communities that other parts of the world have similar problems,” he says. KGS has published the findings of his research in 2008 in “Foundation Problems and Pyrite Oxidation in the Chattanooga Shale, Estill County, Kentucky,” KGS Report

of Investigations 18 (ser. 12), and the symposium papers on the topic will be published in the near future.

Anderson notes that Dublin and London, England, have similar problems with pyritic soils, and many homes in the Dublin area have become uninhabitable because of foundations and floors heaving, bowed walls, inoperable doors and windows, collapsed ceilings, and damaged utility lines. Many of the owners of homes and buildings have begun legal action in the Irish courts concerning responsibility for repairs and compensation.

The other significant issue for Kentucky regarding pyritic soils in black shales, Anderson adds, is that they also produce an acidic soil horizon. Acidic soils will accelerate the weathering and corrosion of any steel pipelines situated in them. In the last 30 years, central Kentucky has had several catastrophic high-pressure natural gas pipeline explosions. “Based on my preliminary research, 40 percent of these pipeline failures occurred in black shale pyritic soils,” he says. In one of those explosions in 1987 in which five fatalities were recorded, pyrite oxida-



Warren Anderson answers questions during his presentation at the Dublin, Ireland, symposium on the use of pyritic shales for construction fill.

tion and sulfate formation was a significant factor in the explosion. The most recent occurred in January 2012 in Estill County.

Anderson says prevention is important because repair costs can be prohibitive, particularly as east-central Kentucky continues its growth and development. KGS has published land-use planning maps for every Kentucky county, useful for avoiding pyritic soils when planning construction projects. Anderson adds that knowledgeable geologic consultants should be employed prior to construction to determine the suitability of a site for the kind of development planned. ❖

ASBOG Council of Examiners workshop held in Louisville

The Kentucky Board of Registration for Professional Geologists hosted a workshop for the Council of Examiners of the National Association of State Boards of Geology (ASBOG) in Louisville in April. A field trip for workshop participants was jointly hosted by the board and KGS on April 15. It included a morning visit to the Jephtha Knob impact structure in eastern Shelby County (right), where William Andrews, KGS Geologic Mapping Section head, answered questions. Effects of impacts on carbonate rocks and the geomorphic evolution of the Jephtha Knob structure were discussed.

The afternoon portion of the trip provided participants with an opportunity to collect a variety of prolific invertebrate fossils, including brachiopods, strophomenids, and branching bryozoans from Ordovician carbonate rocks. The trip was led by Andrews, Patrick Gooding of KGS, and Frank Etensohn of the University of Kentucky Department of Earth and Environmental Sciences. ❖



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and field teams. When relaxing, he spends most of his free time reading theology books and the Bible and enjoying the outdoors. In his younger days he rock-climbed and white-water paddled, both of which he wishes to pass on to his daughters as they get older.

When I asked Seth what he thought of Lexington so far, his response was an immediate, “We love it!” He and his family immediately fell in love with the landscape and the people of the Bluegrass. Noting the sense of community he feels whenever in the South, Seth said, “Everyone looks you in the eyes and smiles here and I haven’t experienced that in many of the other places I’ve lived before.” Both of the Carpenters, being from southern states, are glad to be back home. ❖



John Hickman of the Energy and Minerals Section answers questions about displays in a core characterization and analysis session during the KGS annual seminar, May 18.