



Illinois Groundwater Association Fall 2009 Newsletter

Advancing Groundwater Knowledge Since 1983

Volume 25, Number 2
September 2009

Special Features:

- Abandoned Mine Mapping at ISGS
- National Geologic Mapping Program
- Institute of Natural Resources Sustainability
- ISGS Field Trips

IGA News:

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- Spring 2009 IGA Meeting at NIU Rockford
- IGA Student Grants
- IGA Meeting CEUs
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- 2010 IGA Election

Illinois Groundwater:

- Geology Intern Bill Passes
- Future Groundwater Supplies a Growing Concern
- IDPH Private Well Testing Recommendations
- Mega Dairy Karst Study in Jo Daviess County by ISGS

From The Chair

Dr. Melissa Lenczewski, Northern Illinois University

This year the spring bi-annual IGA meeting was held in conjunction with the North-Central Section of the Geological Society of America (NC-GSA) in Rockford Illinois. We get the chance to work with NC-GSA only every half decade or so, and we were pleased to have the opportunity. The NC-GSA meeting attracted over 600 geologists while we had around 45 people attend our meeting. The IGA meeting set the stage for groundwater related

talks and posters at both meetings. IGA sponsored a poster section on hydrogeology at NC-GSA meeting in which over 30 posters highlight different research projects from across the Midwest. The session was very crowded with great questions being asked of all of the students and researchers alike.

The Fall Annual meeting will be held in Springfield this year. We realize that Illinois is a big state and that travel can be a burden on each of our time and financial budgets. With this in mind we alternate our meeting locations between northern and central Illinois so that we can accommodate as many people as possible.

The topics for the Fall 2009 IGA meeting on November 3rd will focus on groundwater issues and research that are occurring in the central part of Illinois. These groundwater issues are not unique to central Illinois, however, and will have technical, policy, regulatory and planning insights for the rest of the state. The University of Illinois, Springfield campus will provide for a great venue for discussion and catching up with old friends. It is located on the main campus and lunch will be provided with your registration. Remember that you can pay your IGA yearly dues and pre-register and pay for the IGA meeting via PayPal at the IGA web site:

<http://illinoisgroundwater.org/join.html>. If you have other suggestions of ways to improve the organization, let us know. I hope to see you in Springfield in November. We know it is Election Day so you might want to request an absentee ballot in advance.



Fall 2009 IGA Meeting at U of I Springfield

The Illinois Groundwater Association is holding its Fall 2009 Association meeting on Tuesday, November 3rd at the University of Illinois Springfield (UIS) Conference Center, room PAC C/D. The Conference Center is located in the UIS Public Affairs Building at 1 University Plaza, Springfield, Illinois. Parking is available to meeting



U of I Springfield Conference Center

attendees in Parking Lot D. Directions to the university can be found at <http://www.uis.edu/maps/drivingDirections.html>. As Springfield is the home of several government agencies and consulting firms, we anticipate this location could allow a convenient opportunity for local speakers and groundwater professionals to come together. The provisional agenda is on page 6 of this newsletter.

Spring 2009 IGA Meeting at NIU Rockford

Northern Illinois University (NIU) hosted the Spring 2009 IGA and 2009 North-Central regional Geologic Society of America (NC GSA) meeting at the NIU Rockford campus. The IGA meeting was on April 1st and the NC GSA meeting was on April 2-3, 2009.



NIU Rockford Campus

The IGA agenda focused (as always) on groundwater, which complemented the NC GSA program. A regulatory update on dewatering wells used during site development was given by Jerry Dalsin/IDPH, and a summary of Federal government regulatory changes was summarized by Bev Herzog/ISGS. Topping off the regulatory review was Alan Stone of the CES Group, who gave a lecture on the comparison of the TACO R26 equation to alternative models.

Chris Greer/NIU presented the preliminary recharge analysis for shallow glacial and bedrock aquifers in the Troy Bedrock Valley System in DeKalb County. Kane County groundwater modeling was summarized by George Roadcap. Lake Michigan and groundwater issues were discussed by Dan Injerd/IDNR, and Cassandra McKinney gave a summary of McHenry County water supply planning, 3-D modeling, observations, and real-time data collection and modeling.

Spring 2009 IGA Grants Awarded

The IGA offers small grants to partially support student research on groundwater or related topics. Applications are evaluated on the basis of scientific merit, capability of the applicant, and the level of requested funding as it relates to the proposed work. These grants are open to any graduate or undergraduate student registered at an accredited Illinois college or university. A condition of the grant is that grant recipients present the findings of their research at an IGA meeting. The scope of the grants program has been slightly expanded to include research relevant to Illinois

groundwater, not just groundwater research at sites within Illinois. Grants are offered in spring and fall of each year.

The IGA was proud to award two student research grants in spring 2009.

Hridaya Bastola, MS student at ISU, Department of Geography-Geology, Normal, was awarded a \$500 grant. The research topic was identification of preferential pathways for hyporheic flow using bromide tracing as a parallel study on the effects of

seasonal temperature variation on the temperature profile of the streambed. The grant will pay for analytical costs

Benjamin Maas, MS student ISU, Department of Geography-Geology, Normal was also awarded a \$500 grant. The research topic was a short term investigation of spatial and temporal changes in water quality of the Driftless Area in Northwest Illinois. The grant will assist with analytical costs.

Fall 2009 IGA Student Grants

A primary goal of the Illinois Groundwater Association is to foster groundwater scholarship. One way we support this effort is through the student grants page on the IGA web site:

<http://illinoisgroundwater.org/sgrants.html>. The IGA has granted over \$14,000 in direct financial support to deserving students since 1987.

Student grant applications are accepted in the spring and fall of each year, and for fall 2009 we anticipate awarding at least two grants worth a maximum of \$500 each. The fall application deadline is Friday November 13th.

Any undergraduate or graduate student registered for full- or part-time study at an accredited college or university in Illinois is eligible to apply. Notifications have been sent out to many eligible institutions, and we encourage students to submit their applications as early

as possible. The application form and guidelines can be obtained the IGA web site or from:

Edward Mehnert

IGA Grants Coordinator
Illinois State Geological Survey
615 East Peabody Drive
Champaign, IL 61820
217/244-2765
Fax 217/244-2785
mehnert@isgs.illinois.edu

Benefits of the IGA student grants go well beyond monetary support for research. As part of the grant conditions, students present their findings at an IGA meeting - a great opportunity to improve professional presentation skills in front of a supportive and interested audience. Overall, involvement in the IGA gives students a chance to network with groundwater professionals in academia, government and



Student grants help prepare the next generation

industry, learn about relevant issues, improve your resume and hone your skills. Improving groundwater knowledge is what it's all about.

Support IGA with Your Membership Dues

Membership in the IGA is open to anyone interested in the groundwater resources of Illinois, and dues help the IGA meet its educational and charitable mission. Professional member dues are \$25, and student membership is \$5 per year. With your membership dues, you support the IGA. We offer several convenient ways to pay: cash, check or now <http://illinoisgroundwater.org/join.html> with a credit card or PayPal account.

We encourage you to pay online, because it is the quickest and simplest way to help the IGA. Using this payment method also gives you the choice of selecting a recurring or single-year subscription. Never worry about forgetting to pay your dues again!

If you prefer to pay by cash or check, please complete the http://illinoisgroundwater.org/forms/Membership_Form.pdf on the web site or the form below. **Please make checks payable to the Illinois Groundwater Association.** Cash or check memberships expire on December 31st of each year. Online memberships are for 12 months from the date of payment.

	COST	Name: _____
Renew Membership	\$25	Position: _____
New Membership	\$25	Employer: _____
Student	\$5	Address: _____
		Phone: _____ Fax: _____
		E-mail: _____

Clip this form and send with payment to:

Diane Lamb, IGA Secretary
 Hanson Professional Services, Inc.
 1525 S. Sixth Street
 Springfield, IL 62703
 Cell: (309) 256-2199 or Fax: (217) 788-2503
DLamb@hanson-inc.com

IGA Meetings – Get Your CEUs Here

Continuing education units (CEUs) are required for many Illinois professionals. The IGA Fall 2009 program has been approved by the Illinois Department of Public Health as meeting the annual three-hour training requirements for local health department water program personnel as specified in the Local Health Department Grant Protection Rules, Section 615.320 (c) 2. Interested Sanitarians can attend the meeting and have an IGA officer sign their program to show attendance.

The IGA has also been approved for CEUs for Drinking Water Operators, and approval is pending

with the IDPH for CEUs for the Licensed Environmental Health Practitioners.

Other professions also can use the IGA's meetings for CEUs. For instance, Illinois Professional Engineers (PEs) can attend IGA meetings for CEUs.

Some educational programs require that our meeting agenda be preapproved. Be sure to ask an IGA officer in advance if your educational program is included. If it isn't, we'll work with you to meet your educational needs!

Fall 2009 IGA Meeting Registration

Please return a form for each person attending. Registration includes a continental breakfast, a catered lunch and afternoon refreshments. **If you aren't a member yet, become one and save up to \$45 on meeting registrations this year!** Send this information to Diane Lamb, IGA Secretary, by Tuesday October 26th, 2009 by mail, e-mail, or fax (see information below) to qualify for early registration. Make checks payable to the Illinois Groundwater Association if registering by mail, or pay at the conference if registering by email or fax. For faster and simpler registration, register online at: <http://illinoisgroundwater.org/meetings/meetings.html>.

Early Registration (received by 10/26/2009)

Member: \$65.00
 Non-Member: \$100.00
 Student: \$20.00

Late Registration (after 10/26/2009)

Late Member: \$75.00
 Late Non-Member: \$110.00
 Late-Student: \$20.00

Contact Information

Name: _____

Position: _____

Employer: _____

Address: _____

Phone: _____ Fax: _____

E-mail: _____

IGA Membership

Membership in the IGA is open to anyone interested in the groundwater resources of Illinois and dues help the IGA meet its educational and charitable mission. Professional member dues are \$25, and student membership is \$5 per year. We offer several convenient ways to pay: cash, check or now at the IGW web site (<http://illinoisgroundwater.org/join.html>) with a credit card or PayPal account.

Membership Dues

(Re)new: \$25.00
 Student: \$5.00

Send registrations and memberships to:

Diane Lamb, IGA Secretary
 Hanson Professional Services
 1525 S. Sixth Street
 Springfield, IL 62703
 Cell: (309) 256-2199 or
 Fax: (217) 788-2503
DLamb@hanson-inc.com

Contact Information

(if same as above, check here)

Name: _____

Position: _____

Employer: _____

Address: _____

Phone: _____ Fax: _____

E-mail: _____

Provisional Agenda
Illinois Groundwater Association
2009 Fall Meeting

November 3, 2009

University of Illinois - Springfield, Springfield, Illinois

- 8:30–9:00 Registration
- 9:00–9:15 Opening Remarks, **Melissa Lenczewski**, IGA Chair
- 9:15-9:45 **Andrew Greenhagen**, *Northern Illinois University*, Laboratory Investigation of Pharmaceuticals in the Subsurface Environment
- 9:45- 10:15 **George Roadcap**, *Illinois State Water Survey*, Modeling the Mahomet Aquifer for purposes of Water Supply Planning
- 10:15-10:45 **BREAK**
- 10:45-11:15 **Derek Winstanley**, *Mahomet Aquifer Consortium*, Regional Water Supply Planning in East-Central Illinois
- 11:15-11:45 **Gary Clark**, *Illinois Department of Natural Resources*, Strategic Plan for a Statewide Water Supply Planning and Management Program
- 11:45-1:00 **Lunch/Executive Committee Meeting**
- 1:00-1:30 **Jerry Dalsin**, *Illinois Department of Public Health*, Updates on New Water Program Developments at the IDPH
- 1:30-2:00 **Edward Mehnert**, *Illinois State Geological Survey*, Geological Carbon Sequestration in the Illinois Basin and Potential Effects on Groundwater
- 2:00-2:30 **BREAK**
- 2:30-3:00 **Steve Wilson**, *Illinois State Water Survey*, Presentation regarding the website www.smallwatersupply.org
- 3:00-3:30 **Bev Herzog**, *Illinois State Geological Survey*, Various Legislative Updates
- 3:30-3:45 Open for Comments/Announcements
- 3:45-4:00 Closing Remarks: **Melissa Lenczewski**, IGA Chair

IGA Officer Candidates for 2010

CANDIDATE FOR CHAIR: MR. STEVEN KROLL is an Indiana, Illinois, and Wisconsin licensed professional geologist with Patrick Engineering, Inc. in Lisle, Illinois. Steve received his B.S. in Environmental Science from Bradley University in 1999 and his M.S. in Geology from Northern Illinois University in 2004. His work as a hydrogeologist has focused on the evaluation of the hydrogeologic impact of mining operations, the characterization and remediation of soil and groundwater contamination, local and regional groundwater resources assessments, landfill siting, and groundwater modeling. Steve has been a member of the IGA since 2002 and was a recipient of an IGA Student Research Grant in 2003.

CANDIDATE FOR VICE-CHAIR: MS. DANIELLE WALLIN is an Illinois licensed professional geologist with Farnsworth Group, Inc. in Shorewood, Illinois. Danielle received a B.S. degree in geology from Eastern Illinois University (1999) and a M.S. degree in geology from Northern Arizona University (2001) with a geophysics emphasis. She specializes in water supply planning and resource evaluation, groundwater well design, Phase I and Phase II environmental site assessments, soil and groundwater characterization and remediation, permitting and project management.

CANDIDATE FOR DIRECTOR: MS. JOYCE HARRIS received her B.S. in Geology/Environment & Natural Resources from the University of Wyoming (2003). She then went to work for an environmental consulting firm as a compliance officer and later as a field geologist in the hydrogeology department, serving coal bed methane operators in the Powder River Basin, Wyoming. In 2006 she returned to Illinois, completing her M.S. in Hydrogeology at Illinois State University (2008). She has recently taken a position as a hydrogeologist with PDC Technical Services, Inc. in Peoria, Illinois.

CANDIDATE FOR SECRETARY: MS. DIANE LAMB Diane Lamb is currently working at Hanson Professional Services. Other professional experience has included hydrogeology work with Andrews Engineering and ISGS geophysics. She has a B.S. in Geology (2002) and an M.S. in Hydrogeology (2004) from Illinois State University. Master's thesis work was partially funded by an IGA student grant and involved working with the Bloomington Water Treatment Plant conducting a dissolved nitrate study within the unsaturated and shallow saturated zones. Diane worked ten years for IDOT in Peoria before returning to college. Involvement in community groups has allowed experience holding various offices and has enabled association with several community organizations.

CANDIDATE FOR TREASURER: DR. STEVE BENNETT received his B.S. (1988) in Geology from the University of Northern Iowa and both his M.S. (1990) and Ph.D. (1994) in Geology from Indiana University. Dr. Bennett joined the Western Illinois University faculty in 1994 and is an Associate Professor in the Department of Geology. He teaches courses in introductory physical geology, environmental studies, oceanography, hydrogeology, and geological field methods. Dr. Bennett is formerly a Director and Chair of the IGA and has served as its Treasurer since 2003.

CANDIDATE FOR STUDENT DIRECTOR: MR. JONATHAN LOVE received his Associates degree in the field of Automotive Technology from Lincoln Land Community College in 2001. He worked as mechanic and carpenter until 2004. In 2009 he received his B.S. Geology with a Conservation-minor from Western Illinois University. He was President of Sigma Gamma Epsilon fall 2008 to spring 2009, and received the Len Assante Scholarship in 2008 from National Groundwater Association. He is currently working towards M.S. in Hydrogeology from Illinois State University.

Illinois Groundwater Association**BALLOT FOR THE ELECTION
OF 2010 OFFICERS****Chair () Mr. Steven Kroll**Patrick Engineering
Lisle, Illinois

() _____

Vice-Chair () Ms. Danielle WallinFarnsworth Group, Inc
Shorewood, Illinois

() _____

Director () Ms. Joyce HarrisPDC Technical Services
Peoria, Illinois

() _____

Secretary () Ms. Diane LambHanson Professional Services
Springfield, Illinois

() _____

Treasurer () Dr. Steven BennettWestern Illinois University
Macomb, Illinois

() _____

Student Director () Mr. Jonathan LoveIllinois State University
Normal, IL 61790

() _____

Instructions: Place an "x" in the box opposite to the candidate of your choice. If you prefer to vote for a candidate not listed, write the name and business affiliation of the candidate of your choice in the space provided and mark with an "x". Write-in candidates must be members of the IGA. Mail or e-mail the completed ballot to:

Diane Lamb, IGA Secretary
Hanson Professional Services
1525 S. Sixth Street
Springfield, IL 62703

Cell: (309) 256-2199 or
Fax: (217) 788-2503
DLamb@hanson-inc.com

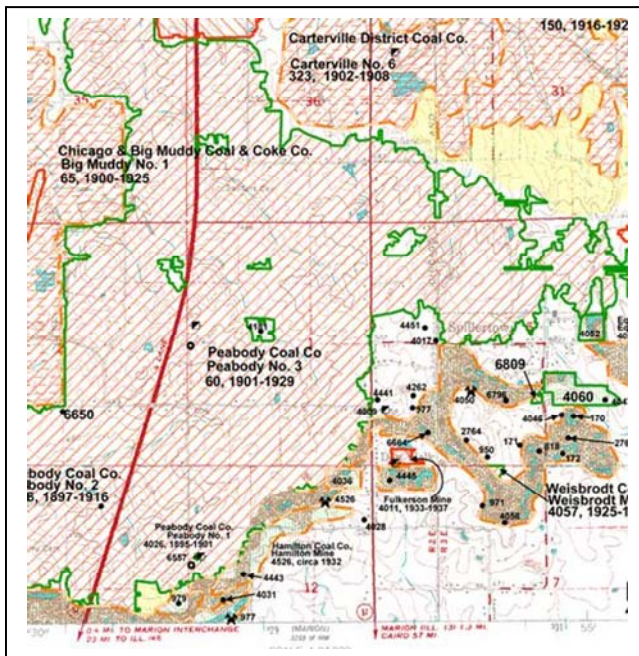
Feature Article

Abandoned Mine Mapping at the ISGS

By David G. Morse, Senior Geologist and Coal Section Head, Illinois State Geological Survey

Knowledge of underground mine locations is important to development planners, transportation designers, and property owners. Population growth in the urban areas of Illinois leads to the need for improved road systems to serve that growth. Buildings, bridges, and roads constructed over old mine workings, which are extensive in some areas of Illinois; present the possible risk of loss or safety from mine subsidence. Therefore, it is important to identify, locate, and map old mine works.

The Illinois State Geological Survey (ISGS) Coal Section is presently mapping mine works at a 7 ½ minute quadrangle scale basis. About one third of the 365 quadrangles containing coal mines have been completed. This work is supported by the Illinois Mine Subsidence Insurance Fund, the Illinois Department of Transportation, and the Illinois Office of Mines and Minerals. Although mines in the State have been mapped at a county (1:100,000) scale, the quadrangle level provides the kind of detail that planners and developers really need to support evaluations of potential and actual mine subsidence when designing infrastructure, planning new housing subdivisions, or developing commercial or industrial growth areas.



Quadrangle selections for mapping are prioritized with areas potentially impacted by urban growth, transportation development, or subsidence problems mapped first. Knowledge of the locations of the mines in these quadrangles will aid in good engineering practices for any planned construction projects, and will help identify areas possibly at risk for mine subsidence.

The ISGS locates the best available map or maps of each of the numerous abandoned coal mines in the selected quadrangles through searches of its own map collections, as well as those of other state and local government agencies, coal mining companies, local museums and libraries, and other potential sources. The boundary of each mined area is digitized and registered to Illinois State Plane coordinates. Digitizing is conducted in a manner that will generally produce outlines that are accurate enough for use at a scale of 1:24,000. Data on the physical characteristics of the mines (e.g. depth and thickness of seam, mining method, known mine stability problems), historic data (e.g. ownership of mine, dates of operation, total production),

and sources of data are compiled, tabulated, and reported in a quadrangle mine directory. Production totals are used to estimate the size of the mine and to compare this estimate to the size of the mine shown on the map. They may also be used to estimate the ultimate size of the mine when the best available map is not "final". The highly detailed search of mine records commonly will document mines that were previously unknown.

The above figure depicts a small segment showing several square miles from the Johnston City 7 ½ minute Quadrangle in southern Illinois that shows both surface and underground mines. This quadrangle from just south of Marion in Williamson County is one of the most heavily mined in the State. I-57 is the major N-S highway shown in red. Quadrangle scale maps are available for public download at the ISGS Coal Section website:

<http://www.isgs.uiuc.edu/maps-data-pub/coal-maps.shtml>

Feature Article

National Cooperative Geologic Mapping Program

By Steven E. Brown, Head, Quaternary Geology Section Geologic Mapping and Hydrogeology Center Illinois State Geological Survey and John C. Steinmetz, Director and State Geologist, Indiana State Geological Survey

The National Cooperative Geologic Mapping Program (NCGMP) provides resources to map the Nation's high priority areas "that help to sustain and improve the quality of life and economic vitality of the Nation and to mitigate natural hazards." The objectives of the National Cooperative Geologic Mapping Program, as outlined in the National Geologic Mapping Act, are to:

- Determine the Nation's geologic framework through the systematic development of geologic maps, such maps to be contributed to the National Geologic Map Database;
- Develop complementary national databases (e.g., geophysical and paleontologic databases) that provide value-added information to the National Geologic Map Database;
- Apply cost-effective mapping techniques that assemble and disseminate geologic-map information, and that render such information of greater application and benefit to the public; and
- Develop public awareness of the role and application of geologic-map information to the resolution of national issues of land use management.



Steven Brown

The program directs federal funds for geologic mapping to the US Geological Survey, state geological surveys, and universities through the three components of the program: FEDMAP, STATEMAP, and EDMAP, respectively. Awards are made annually on a competitive basis. Participants in the program prioritize mapping projects to meet national and local needs for geologic information and to train new geologists as a part of their graduate school curricula. For state geological surveys, mapping priorities are set by the state geologist in consultation with a geologic mapping advisory committee which typically includes a broad cross-section of geologic map users. Some of you volunteer your time on these committees, and your time, expertise, and participation are greatly valued.

Illinois and Indiana have been participating in STATEMAP since its inception in 1993, receiving about \$2.7 million and \$2.3 million, respectively, in federal dollars. States are required to match federal dollars, and both surveys have been able to achieve this. Both states share common geologic heritage and include natural resources associated chiefly with Paleozoic rocks and glacial deposits. Mapping areas are selected based on geology—where natural resources occur or where there are natural hazards—and on a variety of societal needs. In Illinois, detailed bedrock geologic mapping has taken place mainly in southern Illinois where rock is exposed at or near the land surface. This mapping has identified rocks and geologic structures in the Illinois Basin where coal, oil and gas, and carbonate aggregate are the primary resource needs. In Indiana, bedrock geologic mapping has recently been ongoing near Bloomington, an area famous for dimension stone used for buildings like the Pentagon and the Empire State Building. Both states have also mapped glacial deposits where the need for groundwater resources or aggregate is a priority or where geologic materials are susceptible to shaking from seismic activity. Mapping areas include collar counties surrounding Chicago, the St. Louis east metropolitan area, and Indianapolis and its suburbs.

While new computer technologies have advanced our capabilities to manage large datasets, visualize geology in two and three dimensions, provide digital datasets to customers, and publish information in a variety of media, field work is still the mainstay of geologic mapping. In particular to meet the data needs of 3-D mapping, both surveys have concentrated on subsurface exploration, using a variety of drilling and

National Cooperative Geologic Mapping (continued)

geophysical methods to obtain direct and indirect observations of subsurface deposits and sequences. We still search for outcrops, both natural and man-made, and map what we see and learn in the field using paper and pencil (or a laptop computer).

For more information about where we are mapping and the availability of geologic maps, contact us online, by phone, or stop by.

Indiana Geological Survey
611 N. Walnut Grove Avenue
Bloomington, IN 47405-2208
<http://igs.indiana.edu>

Don Keefer
Director, Geologic Mapping and Hydrogeology Center
(217) 244-2786
keefer@isgs.illinois.edu

John C. Steinmetz
Director and State Geologist
(812) 855-5067
jsteinm@indiana.edu

Institute of Illinois State Geological Survey
Institute of Natural Resource Sustainability
University of Illinois at Urbana-Champaign
615 E. Peabody Dr.
Champaign, IL 61820
<http://www.isgs.uiuc.edu/>

National Cooperative Geologic Mapping Program and Illinois and Indiana STATEMAP Project Information Sheets
<http://ncgmp.usgs.gov/>

Geology Intern Bill Passes

Bill Dixon, CPG-3659, Practical Environmental Consultants, Inc.

The geologist intern bill (House Bill (HB) 888) was signed by Governor Quinn on August 25, 2009 and is now Public Act 96-666. The Geologist Intern amendment to the Geologist Licensing Act met key milestones: it passed the House on March 27, 2009 (the vote was 105-1-0), then the Senate with 2 amendments on March 19, 2009 (the vote was 58-0-0), and the 2 Senate amendments were passed by the House on March 28, 2009 (the vote was 116-0-0). More information can be found at this link:
<http://www.ilga.gov/legislation/publicacts/fulltext.asp?Name=096-0666&GA=096>

The purpose of the Geology Intern bill (HB 880) is to modify the existing professional geologist legislation to allow candidates for licensure to take the Fundamentals of Geology (FG) portion of the examination right after graduation or in the final semester immediately before graduation. New candidates for licensure will not have to wait 4-years after graduation in order to take the ASBOG Fundamentals of Geology examination. The Board of Licensing is expected to address rule making under the Act at their November 2009 meeting.

Illinois schools may utilize the FG examination, if they so choose, as an exit exam as is done in Mississippi and Kentucky. Currently, there is no system of accreditation for geology departments, but the exit exam method allows them to self-evaluate their programs by seeing how their students perform on the several domains, or broad topics, within the FG examination. The students are required to take the exam to obtain their degree, but they do not have to pass the exam. If they do pass the exam, they are one step closer to being licensed.



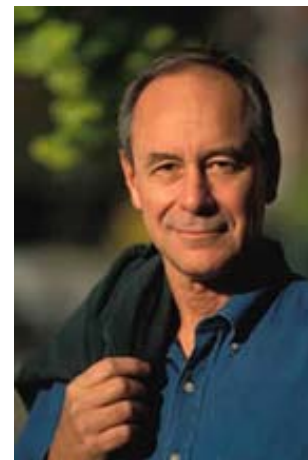
Feature Article

Institute of Natural Resource Sustainability

The New Home of the State Scientific Surveys

By William W. Shilts, Executive Director of the University of Illinois Institute of Natural Resource Sustainability

In 1851, the Illinois General Assembly passed a bill providing for a “Geological and Mineralogical Survey” of the State. They engaged a geologically trained medical doctor, J.G. Norwood, based in New Harmony, Indiana, to do the Survey, which was completed in 1875. Meanwhile, in 1858, the Illinois Natural History Society was created in Bloomington, Illinois, and through the efforts of John Wesley Powell, state funds were appropriated to support the Society’s museum, which evolved into the Illinois Natural History Survey (INHS). INHS was relocated to the new campus of the Illinois Industrial University in Urbana in 1885, under the world-famous ecologist, Stephen Forbes. While curator of the Natural History Museum, Powell was contracted by the federal government to explore the Grand Canyon and eventually was appointed the second Director of the U.S. Geological Survey in 1881. In 1895, the Illinois State Water Survey (ISWS) was established on the Urbana campus of what had become the University of Illinois, primarily to provide chemical analyses of the State’s drinking water, which was commonly polluted in those days. In 1905, the Illinois State Geological Survey (ISGS), which had been shut down in 1875 for lack of funding, was recreated on the University of Illinois’ campus through the efforts of University of Chicago professor T.C. Chamberlin, arguably one of the greatest geologists of all time. Finally, in 1985, the Hazardous Waste Research Center (now the Illinois Sustainable Technology Center – ISTC), was created at the Water Survey and detached as a separate ‘Survey’ to address serious hazardous waste and pollution problems in the State.



On July 1, 2008, for the first time, the State Scientific Surveys became wholly a part of the University of Illinois, gathered under the umbrella of the new ***Institute of Natural Resource Sustainability***. With over 600 scientists, technicians, and support staff and an annual budget of over \$60 million (of which only \$16 million is appropriated), it is one of the four largest Institutes on Campus. The Institute’s Surveys are respected as leaders in natural resource research throughout the nation and world, one of the main reasons that I came from the Geological Survey of Canada to lead the ISGS in 1995.

The Surveys have played major roles in integrating science with the traditional demands of the agricultural/industrial societies so typical of the Midwest. In contributing to the solutions of Illinois’ natural resource issues, the Surveys have used the state as their ‘laboratory’ to study and resolve many environmental and economic development issues that can be extrapolated to the region and the nation. This Illinois-centric research has had a national and worldwide impact on natural resource science and management.

Historically, among many other accomplishments of international significance, the Surveys were responsible for or played an important part in the following:

- The Water Survey was the first research institution to use weather radar, which it pioneered (1948) to detect a tornado (1953), and developed the nation’s first Doppler weather radar in 1968.
- The Water Survey pioneered the development of universally applied groundwater flow models, the most recent of which have been applied to understanding how to manage our own Mahomet Aquifer.
- The Geological Survey, in the 1950’s, developed the field of ‘Environmental Geology’, an academic and applied discipline taught and practiced around the world today.
- Models for understanding and exploring for coal deposits were developed at the Geological Survey and are still used around the world. Most recently, Survey geologists introduced the world to a 350 million-year-old ecosystem, exposed and preserved in fossil form in the roof of a coal mine near Danville.

Feature Article

Institute of Natural Resource Sustainability

(continued)

- The Natural History Survey's attempts to 'pick up the pieces' in the ecologically disastrous aftermath of uncontrolled pesticide spraying in Iroquois County, Illinois figured prominently in Rachel Carson's 1962 book, *Silent Spring*, which touched off the modern environmental movement. The Survey has continued to be a leader on the national environmental scene.
- Stephen Forbes, one of the founding fathers of the Natural History Survey, was a leading force in the development of the field of ecology, itself.
- During its relatively short history, the ISTC has pioneered the application of diffusion principles to encourage the adoption of pollution prevention technology to businesses in Illinois.

The Water Survey has continued to be at the forefront of Global and Regional Climate modeling, and three of their scientists were among those sharing the Nobel Prize awarded to authors of the 2007 report of the Intergovernmental Panel on Climate Change. The Survey is also heavily engaged in county and state-funded water planning projects, in Illinois River restoration research, and manages the National Atmospheric Deposition Program.

Besides providing the technical foundation for the successful Illinois bid for the state-of-the-art FutureGen clean coal project, the State Geological Survey and its INRS affiliate, the Advanced Energy Technology Initiative (AETI) lead one of seven US Department of Energy-funded partnerships, scattered across the continent and dedicated to developing practical methods for geological storage of carbon dioxide from power plant emissions. Our partnership is funded at more than \$100 million to carry out a ground-breaking project in which one million tons of carbon dioxide will be provided by and permanently sequestered in a highly saline aquifer 7000 feet beneath Archer Daniels Midland Company's ethanol facility in Decatur, Illinois. This project will make the University of Illinois a world leader in this vital aspect of clean coal technology research.

The Natural History Survey and the University's Department of Natural Resources and Environmental Science have begun exploring opportunities for joint teaching and collaborative research. The Survey is also heavily involved in Great Rivers research on the Mississippi and Illinois Rivers and sponsored a highly successful, day-long ecological symposium in celebration of its 150th anniversary. It carries out a large variety of sponsored projects as a research arm of the Illinois Departments of Transportation and Natural Resources.

Finally, ISTC recently sponsored a very well-attended and well-received joint conference on Biofuels and Sustainability in cooperation with the University's Center for Advanced BioEnergy Research and the Energy Biosciences Institute. The Center also has continued to develop techniques for removing sediment from impoundments on the Illinois River, restoring local habitats and transporting the removed sediment to restore habitat in brownfield areas in Chicago.

The new Institute represents a scientific partnership between the University and the Surveys that is unique in the nation, and well-suited to meet the challenges of natural resource research and management in the 21st century. The Surveys have long been national leaders in bringing cutting-edge science and technology to bear on clean coal technology; urban redevelopment; ecosystem preservation and restoration; fish, wildlife, and invasive species management; groundwater and watershed management; fossil energy development; carbon capture and sequestration; climate modeling; and a host of other issues that require sound, unbiased scientific and technical input. The intellectual and physical resources of the University enhance the Surveys' capacity to address environmental, economic, and social issues that are important to Illinois, the nation, and the world. The Surveys' close working relationship with counties, municipalities, industries, and organizations across the state ensures that cutting edge science doesn't stay isolated in textbooks and journals, but rather informs real decisions affecting resource management.

Feature Article

ISGS Field Trips – Public Outreach for 80 Years

Wayne T. Frankie, Geologist and Outreach Coordinator Illinois State Geological Survey

This fall, on October 24 and November 14, 2009, the Illinois State Geological Survey (ISGS) is leading a public Geological Science Field Trip within the *Garden of the Gods* area in southern Illinois. These field trips mark the 80th anniversary of the Illinois State Geological Survey's commitment to conduct public field trips for the benefit of the citizens of Illinois. Since the first field trip, in 1929, the public has been invited annually to join scientists from the ISGS on these field trips.



Currently the Survey conducts two field trips in the fall and two in the spring each year. Each trip is designed to acquaint the participants with the geology, landscape, mineral resources, and biodiversity of a different part of the state. The field trips are conducted using car caravans, which follow a detailed road log. Several stops are scheduled along the route. At each stop, the participants listen to an informative, insightful, and sometimes humorous description of the stop. Participants also have the opportunity to explore a special area, talk with geologists and other experts, ask questions, or simply admire the view. One of the most enjoyable aspects of the trips is the chance to collect rocks, minerals, and fossils.



People of all ages are welcome. Participants range from retirees to local residents; earth science and geology classes; Boy Scouts and 4-H youth; families; and a variety of others, including vacationing tourists from several different states and countries.

A guidebook explaining the geology, topography, and cultural features along the route and at the stops is given to each participant. A list of guidebooks from previous field trips is available for use in planning your own class tours or private outings. The trips are especially helpful to teachers of earth science classes, and several colleges and universities regularly use the guidebooks to conduct their own tours.

The Garden of the Gods area is located within the Shawnee Hills of southern Illinois. Trip participants will view many interesting rock formations, given names such as Camel Rock, Anvil Rock, and Devil's Smokestack. These rock formations and cliffs at the Garden of the Gods are made of sandstone deposited 320 million years ago during the Pennsylvanian Period. Overlying these sandstones, in the northern part of the field trip area, are the Pennsylvanian coal-bearing shales, siltstones, and sandstones formed about 300 million years ago. In the southern portion of the field trip area lie exposures of older limestones and shales that were deposited during the Mississippian Period about 340 million years ago, when Illinois lay close to the equator and near the shore of a shallow tropical sea. These Mississippian bedrock layers hold abundant marine fossils.



The Garden of the Gods area of southern Illinois is south of the rolling topography of the glaciated till plains of the Illinois Glacial Episode. The hilly topography (hence, the name, Shawnee Hills) is a result of tectonic uplift and the absence of glaciation. Within the Shawnee National Forest are large natural ecosystems relatively unchanged by humans. While hiking the trails in this unglaciated area, field trip participants will experience some of Illinois' unique biodiversity, including sandstone glades, upland forests, and deep mesic (wet) ravines where distinctive relict northern plant species have persisted since preglacial times.

For information about ISGS research and service or details of the 2009-2010 field trips, contact the Illinois State Geological Survey at (217)333-4747 or 244-2427; TDD (217)782-9175 or visit the ISGS Web site at <http://www.isgs.illinois.edu>

Illinois Groundwater Update

Future Groundwater Supplies a Growing Concern

The Illinois State Water Survey (ISWS) reports (<http://www.isws.illinois.edu/docs/pubs/ISWSCR2009-07/>) that population growth and subsequent increasing demand could threaten the quantity and quality of public water supplies in the next few decades. Projections indicate that water use may increase by 50 percent in the next 40 years. Increased groundwater pumping leads to higher costs, well failures, less

groundwater flow to streams and lower water levels in lakes and wetlands. Community and county-level groups are realizing that water supply planning is a priority issue, and the ISWS can assist water supply planners to assess water supply conditions, availability, quality and use of surface and groundwater resources. For more information on water supply planning contact the ISWS Center for Groundwater Science at (217) 333-4300.

Private Well Testing Recommendations by IDPH

The Illinois Department of Public Health (IDPH) reviews public water supply contamination data from the Illinois Environmental Protection Agency (IEPA) and issues recommendations to private well owners to have their wells tested. Recommendations to test wells for contamination were recently made by the

IDPH for the private well owners in Libertyville, Antioch, and the Bradley Heights subdivision near Rockford. More information on the water well testing advisory press releases is available at the IDPH web site: <http://www.idph.state.il.us>

Megadairy and Karst in Jo Daviess County

As reported at the Illinois State Geological Survey (ISGS) web site (<http://www.isgs.illinois.edu/research/karst-jd.shtml>) the ISGS was asked by the Jo Daviess County Board and the Illinois Attorney General to examine the geology and hydrogeology of a proposed mega dairy site near Nora, Illinois in Jo Daviess County. The Board and Attorney General were concerned about the suitability of the area for a mega dairy due to the volumes of animal waste generated at this type of facility and that the area may be karst terrain. The geologists and engineers hired by the owners of the proposed mega dairy found no evidence of karst at the site even though the ISGS documented karst in reports in 1997.

The ISGS completed its initial evaluation in 2008, which were published as ISGS Open File reports (Panno 2008a and 2008b; Panno and Luman 2008), which concluded that the proposed mega dairy sites contained karst features and were underlain by a karst aquifer.

The mega dairy was approved by the Illinois Department of Agriculture and construction started in early 2008 after the publications of the ISGS reports. An injunction to stop the construction of the mega dairy was brought by a group of local property owners, and was granted at the end of 2008.

Alternate interpretation of the ISGS karst findings were made by representatives of the mega dairy. Therefore, the ISGS conducted additional investigations in 2009 using LiDAR imagery, ground penetrating radar (GPR), and an examination of the proposed sites. This investigation focused on putting the geology and hydrogeology into a regional context. The 2009 report concluded that the consultants for the mega dairy focused too much on the site, and in doing so reached erroneous conclusions on the suitability for the mega dairy. Some of the 2009 report findings confirmed 1990s reports that identified the area as karst terrain with a karst aquifer, and cited a half dozen studies to verify their findings.

LiDAR data identified prominent lineaments in the study area that intersect the proposed dairy sites. The LiDAR reflect a pattern of and geometry of the underlying karst aquifer. GPR data show that solution-enlarged crevices are only the tip of deeper bedrock crevices.

The 2009 report concluded that the 2009 data and previous investigations indicate that the mega dairy overlies karstified carbonate rock that is a karst aquifer. It is, therefore, highly susceptible to groundwater contamination. The sediments and shale at the proposed dairy site are only 10 to 20 feet thick, so a breach in animal waste lagoons could result in widespread contamination. Further, spreading of waste on farm fields may also pose a groundwater and surface water risk.



