



# Illinois Geology

Information  
and  
Innovation

Illinois State Geological Survey  
Annual Report 2004



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# Illinois Geology

## Information and Innovation

**Annual Report 2004**

Department of Natural Resources  
**ILLINOIS STATE GEOLOGICAL SURVEY**  
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# To Our Staff and the People of Illinois Watersheds

As earth scientists, we usually think of watersheds as being bounded by a ridge, a divide, or a height of land that separates water flowing within one drainage system from water flowing within another. Just as there are divides on the landscape, so are there divides in our own lives or in the life of the organization in which we work. My dictionary includes the definition of a watershed as “a crucial turning point affecting action, opinion, etc.; a change of course.”

As an institution, the Illinois State Geological Survey (ISGS) experiences major watersheds in its ninety-ninth year. The long-range impacts of these institutional watersheds are difficult to predict, but there are watersheds in the histories of all organizations, and the changes in direction generally work out for the best.

## IDNR

I alluded to the first watershed event we experienced this year in my address delivered to the ISGS staff December 2003—the change of government and the probability, since realized, of Joel Brunsvold’s leadership as Director of the Illinois Department of Natural Resources (IDNR). Joel took over officially in February and regards the Surveys and the Waste Management and Research Center as integral, major components of the Department.

This has been the watershed in our relationship with state government and IDNR: We are now, and henceforth will be, an integral and better understood science arm of IDNR. As such, we will be increasingly involved in providing objective data on which environmental and economic decisions made by the governor and by other state agencies may be based.

## UIUC

Another watershed for the ISGS is being created in the relationship of the ISGS with the University of Illinois at Urbana-Champaign. For several years, the Illinois Natural History Survey (INHS) has been looking for new facilities with the objective of vacating their cramped quarters in the Natural Resources Building (NRB) and occupying a larger, more modern facility elsewhere on campus. Their quest has led to an agreement to build new space for them in the University’s South Research Park and, further, eventually to build new facilities for all of the Surveys on a Survey campus, to be located adjacent to the Waste Management and Research Center, the I-Building, and the Natural Resources Studies Annex.



*ISGS Chief,  
Bill Shilts*

It always had been understood that the ISGS would backfill any space the INHS vacated in NRB, bringing in employees and consolidating our programs that are presently scattered around Champaign and Savoy in seven locations. Recently, the University has become directly involved in the ISGS-INHS space issues by agreeing to provide a Survey campus “footprint” and further offering some funds to INHS to help build facilities that would accommodate a complete move of INHS out of the NRB. In return for University support, the Chancellor asked that most or all of the vacated NRB space be filled with a presently inadequately housed University department.

I did not feel that this option was in the best interests of ISGS and argued strongly against such a move. In February 2004, we achieved substantial agreement with the University to share reconstituted space in INHS’ part of the building with the University’s School of Social Work. This agreement led to reexamination of the original agreements that govern Survey-University relations and the 65-year-old agreement between the Surveys and the University’s Board of Trustees about the use of NRB, which is essentially an industrial building that was built with state and federal funds and turned over to the University for management in the Surveys’ best interests, as is recorded in the stone inscriptions of the main entranceway to the NRB.

At the same time as those space issues were in discussion, the University was required as a result of a federal audit to remove all of the Surveys and Center from its base overhead calculations, reducing the allowable overhead (facilities and administration charges) we can bill on federal contracts from the campus-wide rate of 53% to 31.7%, potentially causing a significant decrease in the discretionary funds that are critical to our ability to be flexible in financing our programs, particularly in times of state financial crises. In discussions with the University, Survey and Center financial officers were able to have that rate adjusted upward, and we have reached an agreement with the University that removes the negative impact of the reduced rates.

These two issues and the frank discussions of the Surveys’ interests in relation to the University’s interests and priorities have led both sides to better understand our legal, legislative, and traditional relationships and responsibilities. This understanding, in turn, has led to a watershed in Survey-University relationships: We

*Natural  
Resources  
Building*



## ISGS Awards

During its annual award ceremony, December 5, 2003, the Illinois State Geological Survey honored State Senator Stanley B. Weaver with its Outstanding External Advocate Award, given in recognition of Weaver's strong public advocacy of the Survey and its programs. The award was presented posthumously.

"During his long tenure as an elected representative for central Illinois, Senator Weaver was a steadfast supporter of ISGS programs and worked hard to ensure us adequate appropriations and recognition in state government," said Beverly Herzog, chair of the Survey award committee. "He was always open and accessible, served as a sounding board, and offered good advice on many delicate procedural and programmatic issues."



*Bill Shilts presented the ISGS Outstanding External Advocate Award to Blake and Sherry Weaver, representing their father, the late State Senator Stanley Weaver, recipient of the award. Shown (left to right) are Debra Griest, ISGS; Blake Weaver, Bill Shilts, Sherry Weaver, and Morris W. Leighton.*

Also honored were three Kane County officials who received the Survey's Outstanding External Cooperator Award: Kane County Board Chairman, Michael McCoy; Kane County Development Department Executive Director, Philip S. Bus; and Kane County Water Resources Department Director, Paul M. Schuch. The award was presented for significant support of research by the ISGS and by the Illinois State Water Survey to provide a scientific basis for water resources planning in Kane County. Faced with projections of significant population growth and shortages in water supply, the three men secured \$1.8 million to map the county's groundwater resources, funded the development of a groundwater flow model of the area's bedrock aquifers, and helped create a one-day water supply planning workshop for local officials and water resources professionals.

ISGS staff members Ilham Demir, David Morse, Scott Elrick, Cheri Chenoweth, and Russ Jacobson were honored with the Outstanding Achievement by a Team Award for their evaluation of coal bed methane resources at five sites in Illinois. The work involved drilling five wells and analyzing dozens of coal samples as part of a contract with the Illinois Department of Commerce and Economic Opportunity. This study provided more accurate estimates for the potential of Illinois coal to produce economic amounts of natural gas.

James Cokinos and Chris Manrique were honored as Outstanding New Staff Members, Cokinos for his work in designing and coordinating multiple databases and a mapping program interface as part of a project to improve oil recovery in the Illinois basin and Manrique for outstanding contributions in clean coal research through computer programming, design, and engineering work as part of the ISGS coal fines cleaning program.

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*"to serve as a North American model for multidisciplinary geological survey research in the twenty-first century."*

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will henceforth expect to have a different relationship with the University of Illinois based on an increased level of mutual understanding and cooperation. Because we and our sister agencies collectively bring in almost 10% of the total University-sponsored research budget, it is a particularly important for both parties to define and nurture this relationship.

## Vision

The impacts of these major watersheds on our future are yet to be fully defined, particularly with regard to the University, but, in our ninety-ninth year, as always, one of the mandates of my job is to provide vision for the ISGS. I have added to our vision statement an important final line to serve not only the state's needs but also to serve national needs. This addition defines what we can be as a provider of earth science information to address a broad range of societal issues in the twenty-first century: It is our intention "to serve as a North American model for multidisciplinary geological survey research in the twenty-first century." Although this may seem like a tall order, I know of no other Survey that has the diversity of research expertise we do, expertise that can contribute to the entire range of technical and scientific earth science issues that must be understood and applied in making the decisions that most effectively ensure the economic and environmental well-being of our citizens.

The ISGS has long been a national and international leader in the evolution of earth science research and service from a narrow focus on resource extraction to a broader focus on environmental geology, resource utilization and protection, and economic development. Our unique, traditional association with the Natural History and Water Surveys and with the Waste Management and Research Center, under the Board of Natural Resources and Conservation, gives us access to a wide range of supporting scientific disciplines that add a strong multidisciplinary capability to our programs.

For our Survey to be a model that others might be inspired to emulate, we all must have a shared and simple vision of our primary mission. Over the past few years, I have simplified our overall research and service direction into two dominant, programmatic "thrusts": (1) our energy thrust, "cradle-to-grave management of carbon," and (2) three-dimensional (3-D) geological mapping, designed to provide detailed knowledge of the surface and upper 1,000 feet of our state at a 1:24,000 scale (1 inch on the map represents 2,000 feet on the ground). Nearly every activity of our Survey is aimed at helping to accomplish the goals of one or both of these thrusts.

## Energy

Through our energy thrust, it is our intention to increase the use and production of Illinois' abundant energy resources in a benign way by designing our research to provide management guidance for efficient and safe extraction of our resources and also for complete utilization or sequestration of the emissions and solid by-products that result from their use. In cooperation with the Kentucky and Indiana surveys and a host of private companies and state agencies, we recently developed a \$3.2 million project, funded by the U.S. Department of Energy (DOE) and the state Office of Coal Development (OCD), to look into the feasibility of sequestering carbon dioxide in a variety of geologic materials.

This project will be undertaken in concert with U.S. DOE and OCD contracts to evaluate coal bed methane potential in the Illinois Basin, a state-funded contract to develop strategy and methods for utilization of presently wasted coal fines and biomass, and state support of research into novel uses of solid waste products produced by coal burning. These projects are taking us rapidly down the road to achieving the research results required to attain zero emissions and the economic recycling of solid wastes that will be necessary to revive our coal and power industries.

Spin-offs from this research, transferred to the private sector, have the additional potential to market and sell Illinois technology to help our rapidly developing neighbors in Asia and eastern Europe (and elsewhere) cope with exponentially increasing wastes associated with the burgeoning power requirements of rapid industrialization. No other North American geological survey, as an entity, is blessed with the internal breadth of technical and scientific expertise that is necessary to accomplish our energy goals. This expertise, combined with our proximity to the considerable intellectual capacity of a great university, many of whose students and professors join us in cooperative projects, allows us to compete effectively for contracts of national significance.

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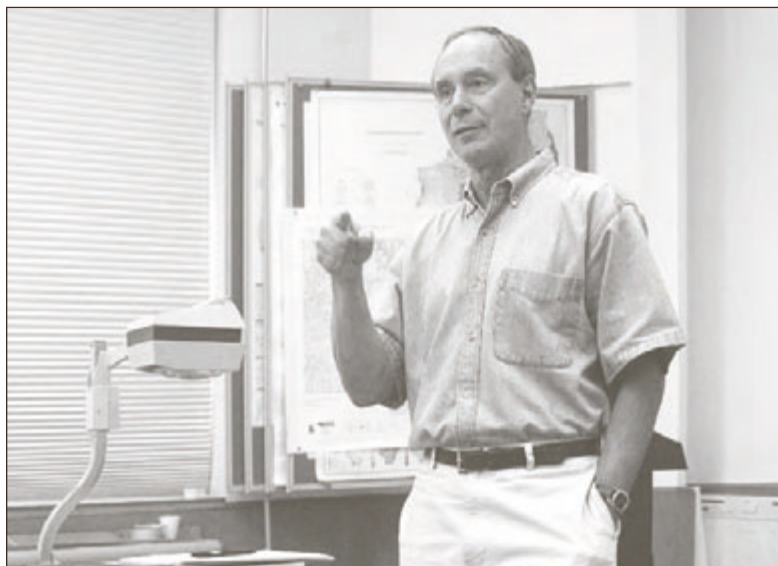
*"The technical contributions . . . to industry, academia, and government are valuable transfers of information and critical to the advancement of the geosciences. I encourage you (Hannes Leetaru) to continue with your work and make presentations at future section and national meetings."*

—Steven P. Zody  
President, AAPG Eastern Section

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### 3-D Mapping

Our modern mapping program has been active for several years now, and considerable resources from the federal and state government have been invested in perfecting the field, data processing, and publishing techniques necessary to produce usable, useful, and contemporary geologic maps. Our Ohio, Michigan, and Indiana state partners in the Central Great Lakes Geologic Mapping Coalition accompanied us to Washington, D.C., in February to visit all the members of the four states' congressional delegations. We have had letters of support the past two years, signed by all the members of Illinois congressional delegation, but we need to have support of delegations from all the states to realize increased funding for this effort.



*Bill Shilts summarizes the progress of the Coalition mapping effort and funding progress during his presentation at the Illinois Geologic Mapping Advisory Committee (IGMAC) meeting, held fall of 2003.*

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*"The Illinois Department of Transportation, District 8, would like to offer its appreciation for the geological mapping services that the ISGS performs. The products that are produced by ISGS supplement our geotechnical investigations. Not only are the products used in the preparation of preliminary geotechnical reports, but also in determining anticipated subsurface conditions prior to in-depth investigations. The mapping work that is currently under way in the Grantfork, Highland, and New Douglas Quadrangles will be useful in future District projects. The Illinois State Geological Survey mapping program continues to play an important role by assisting in the development of geotechnical and foundation recommendations for transportation projects throughout the District."*

*—Mary C. Lamie, District Engineer,  
Brent A. Guttman, District Geotechnical Engineer  
Illinois Department of Transportation, Collinsville*

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*Angel Martin, United States Geological Survey, and Bill Shilts, ISGS Chief, discuss the geologic mapping efforts of the Central Great Lakes Geologic Mapping Coalition at the Illinois Geologic Mapping Advisory Committee (IGMAC) meeting, held during the fall of 2003.*



In terms of the vision I described earlier, Richard Berg visited Poland last autumn, where he lectured on the ISGS 3-D mapping program at the invitation of NATO, a sign of international recognition that ISGS is on the leading edge of the 3-D geological mapping revolution in which all of the more than sixty geological surveys in North America are engaged to one degree or another.

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*"I just wanted to express my appreciation to you and your staff for the interactive map on your Web site. I have been using it daily for the past several months and have found it very useful. The newest version is significantly improved and those of us who are prospecting remotely have found the site invaluable. With the API numbers easily determined for each well, I can place an order for e-logs over the phone with ease. My compliments to you and your staff."*

*—Ronald D. Perkins  
Professor Emeritus  
President, Perkins Exploration & Consulting, Inc.  
(e-mail)*

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## ISGS

To accomplish our mission, I see the various functions of the sections in the Survey as falling into three major, mutually dependent sectors. Our largest sector, the basic and applied research and service sector, comprises the Environmental Geoscience Center, Energy and Earth Resources Center, and Transportation and Environment Center. This sector has as its primary products service, education, and intellectual analysis and insight (research) into the geoscientific issues that confront Illinois society. The bulk of our employees are scientists and technical staff who are hired to conduct research and provide service within these three Centers.

However, the quality of research and service is partially a function of having the appropriate resources to do the job and to carry out the research. Ensuring this support is the function of the financial offices and senior managers. A major responsibility of this sector of the Survey, the “front end,” so to speak, is to facilitate the work of the research/technical part.

Finally, our products must get to the public and to our government and private sector clients promptly and in easily understood and useful formats. That is the challenge of the third Survey sector, the Geoscience Information Center.

All of these sectors—scientific/technical, administrative, and information delivery—are critical to our mission and are interdependent. I see them this way, and I hope all of you do, too. Because I see the workings of our sister agencies and of geological surveys all over North America, I can honestly say that the three interdependent sectors of the ISGS function together as smoothly and effectively as those at any other Survey and are superior to most.

I am committed to making sure that this productive and collegial relationship among the three sectors of our Survey continues to be maintained with the high level of efficiency and comradery we enjoy today and that all employees recognize the essential roles that their associates play in ensuring the smooth operation of the Survey, regardless of where their responsibilities lie.



*Bill Shilts, Chief, and Wayne Frankie, ISGS Outreach Coordinator, help explain the glacial history of the Pekin area to participants on the spring ISGS Geoscience Field Trip.*

## Conclusions

We are a strong geological survey, and our strength is partially in our administrative and scientific relationships with our sister Surveys, Center, and Museum. Our strength lies further in our enhanced status as a valued and mainstream part of IDNR, that is, our status as part of the scientific arm of the Department. In the midst of the state's ongoing economic crisis, we have been able to maintain the state-funded resources that sustain our core scientific mission.

In the difficulties that we have experienced as a result of the University's interest in vacated space in the NRB, we have been strongly supported by the director and deputy director of IDNR and by our Board. Although we remain vigilant as negotiations to resolve our space issues continue among various interested parties, I feel that we have crossed a watershed in our relationship with all of these entities. Our ties with the University remain strong, as do our educational and research ties with other Illinois universities, especially as a benefit of three years of special funding by the Board of Higher Education.

Our mission is clear—first, to help Illinois become a national and international leader and innovator in “benign” energy production and resource utilization and, second, to understand our landmass in three dimensions as a foundation for economic development and environmental security. We are truly at a watershed in our history, poised to make earth science contributions to the state and nation that would make our nineteenth and twentieth century scientific predecessors proud.

—William W. Shilts, Chief

# Active Projects

## Chief's Office

ISGS geologic map products are now available as high-resolution PDF files free for download from the ISGS Web site ([www.isgs.uiuc.edu/isgshome/online\\_maps\\_data.htm](http://www.isgs.uiuc.edu/isgshome/online_maps_data.htm)). These maps have been published as part of the Illinois Geologic Quadrangle (IGQ) or Illinois Preliminary Geologic Map (IPGM) series or represent early versions of maps delivered to the **U.S. Geological Survey** as required for contracts awarded through the STATEMAP appropriation to the National Cooperative Geologic Mapping Program (NCGMP).

Most of these maps are published at the standard 1:24,000 scale for 7.5-minute quadrangles and show surficial geology, bedrock geology, or other types of map data. Thirty-seven maps have been released online, and additional maps will be added to the site as they are completed and released. High-quality, full-size printed copies of IGQ and IPGM maps are also available on demand. The new system significantly increases the public's access to the Survey's growing supply of geologic map products.

The ISGS mapping program director was one of twenty-nine invited workshop participants at a NATO Advanced Workshop on Innovative Geological Cartography, held in Kazimierz Dolny, Poland, during fall 2003. The three-day workshop was the first time geologists from former eastern and western block countries formally met to discuss geological mapping and the disparities between agencies producing geologic maps of varying quality.

The ISGS mapping program director spoke on the usefulness of three-dimensional geologic mapping for groundwater protection and environmental assessment. The workshop produced a set of recommendations to NATO about the need to construct modern geologic maps, preserve key databases, and deliver the geologic information necessary to make important decisions about water resources development, ensure adequate environmental protection, and deal with earth hazards.



Geology of Pulaski Quadrangle, Pulaski County, Illinois



Richard Berg (right), Director of the ISGS geologic mapping program, and Harvey Thorleifson, Minnesota State Geologist, in Kazimierz Dolny, Poland, November 2003, for the NATO workshop on Innovative Geological Cartography.

*Members of the ISGS Database Oversight Team (from left), Debra Griest, Mark Yacucci, Brent Lemke, Barb Stiff, Don McKay, Steve Gustison, Dan Nelson, Alison Lecouris, and Rob Krumm. Damon Garner and Don Keefer not pictured.*



*An ISGS staff committee appointed by the Chief has completed an extensive review of the types of data that are needed and available at the ISGS. The committee also reviewed the present procedures for managing data and making them available in digital form. The committee made a number of recommendations on new staff positions, training, and procedures needed to better archive and preserve the Survey's data holdings and make them accessible to the staff and the public in digital form. Representatives from each of the Survey's sections continue to work with the committee to study database issues in order to expand and improve public access to the millions of pieces of data that are stored at the ISGS in both digital and non-digital forms.*

Assessment of ASTER-based DEM and Shuttle SRTM Data as Input to a Large-Scale Geologic Mapping Program Situated in Midwestern Continental Glacial Terrain, D. Luman.

Association of American State Geologists 2005 Annual Meeting Host, J. Goodwin, D. Gross, T. Kemmis, J. Miner, M. Chrzastowski, M. Chambers, L. Cunningham, S. Greenberg, R. Strawbridge, K. Weaver, W. Shilts, and J. Dexter.

Desktop Mapping—AAPG Short Course Development, J. McLeod and H. Leetaru.

Digital Archive of 1936–1941 Historical Aerial Photography for the State of Illinois, D. Luman, D. Lund, C. Stohr, and S. Beaverson.

*On-line file access to historical aerial photographs dating from 1936 to 1941 is now available for 35 counties, greatly improving access to these images that provide a unique, detailed record of the cultural and physical landscapes of Illinois. The images are intensively used by government agencies, surveyors, planners, consulting scientists, and engineers, among others. Because the original image negatives no longer exist and the print collections are deteriorating rapidly, the scanning project preserves very useful information for future generations.*

Friends of the Pleistocene Field Excursion, D. McKay, R. Berg, A. Hansel, T. Kemmis, and A. Stumpf.

Three-dimensional Geologic Mapping along Illinois 29, R. Berg, D. McKay, A. Stumpf, D. Keefer, and L. Smith.

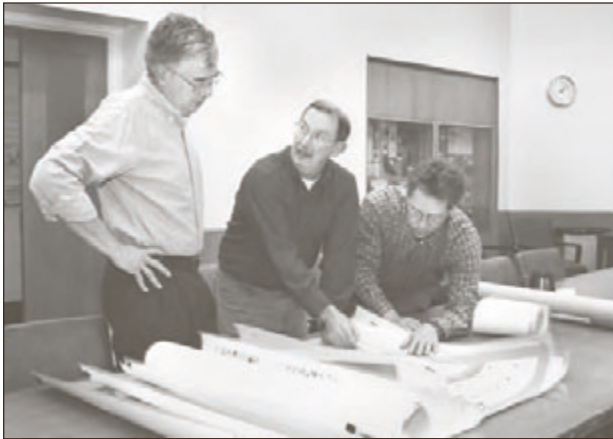
## **Energy and Earth Resources Center**

An Assessment of Geological Carbon Sequestration Options in the Illinois Basin, R. Finley, S. Frailey, H. Leetaru, M. Rostam-Abadi, R. Bauer, S. Bhagwat, S. Chen,

I. Demir, K. Hackley, D. Keefer, E. Mehnert, D. Morse, J. Risatti, B. Seyler, R. Knepp, S. Beaverson, C. Korose, R. Krumm, D. Nelson, D. Garner, and B. Renfrew.

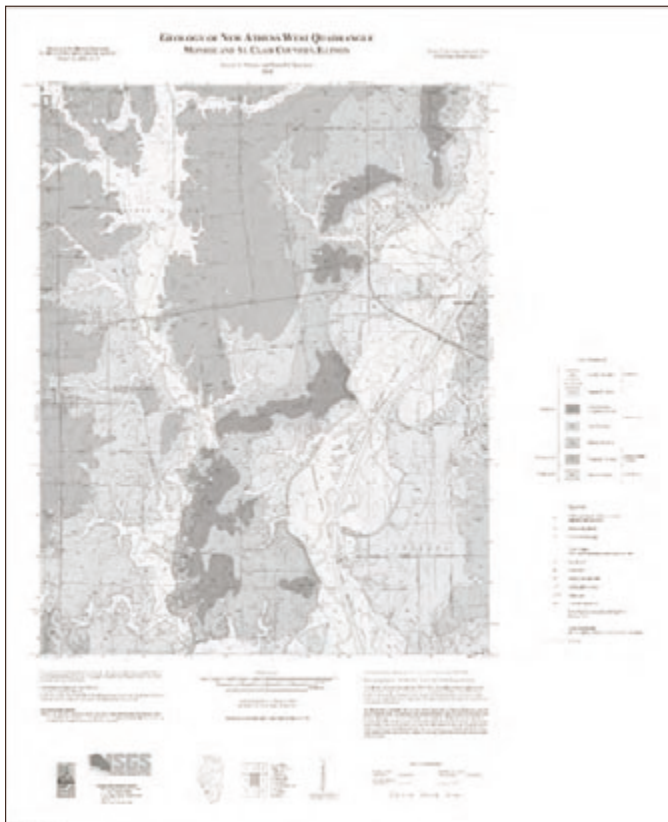
With funding from the **U.S. Department of Energy** and the **Illinois Office of Coal Development**, ISGS scientists are exploring technology options to capture carbon dioxide (CO<sub>2</sub>) from industrial sources and to locate suitable geological formations to store, or sequester, it. This project is critical because CO<sub>2</sub> emissions to the atmosphere, which have risen at an unprecedented rate due to the industrial growth of modern society, are thought to contribute to global warming. The Illinois Basin appears to have multiple possibilities for

geological sequestration. Capturing carbon emissions and storing them below ground should help stabilize atmospheric concentrations until alternative energy sources are feasible.



Rob Finley, Dave Morse, and Scott Frailey study recent information on Illinois formations with the potential to store carbon dioxide emissions.

## Bedrock Geology



Bedrock Geology of the Ava 7.5-minute Quadrangle, J. Devera, B. Denny, J. Nelson, R. Jacobson, J. McLeod, J. Aud, J. Hutmacher, and T. Young.

Bedrock Geology of the New Athens West 7.5-minute Quadrangle, J. Devera, B. Denny, D. Grimley, A. Phillips, J. Aud, and J. Duncan.

Bedrock Geology of the Oraville 7.5-minute Quadrangle, J. Devera, B. Denny, J. Nelson, R. Jacobson, J. McLeod, J. Aud, J. Hutmacher, and T. Young.

Map of the New Athens West 7.5-minute Quadrangle.

Bedrock Geology of the Prairie Du Rocher 7.5-minute Quadrangle, J. Devera, B. Denny, D. Grimley, A. Phillips, J. Aud, and J. Duncan.

Bedrock Geology of the 7.5-minute Raddke Quadrangle, J. Devera, B. Denny, J. Nelson, R. Jacobson, J. McLeod, J. Aud, J. Hutmacher, and T. Young.

Bedrock Geology of the Red Bud 7.5-minute Quadrangle, J. Devera, B. Denny, D. Grimley, A. Phillips, J. Aud, and J. Duncan.

Bedrock Geology of the Rockwood 7.5-minute Quadrangle, J. Devera, B. Denny, J. Nelson, R. Jacobson, J. McLeod, J. Aud, J. Hutmacher, and T. Young.

Bedrock Geology of the Willisville 7.5-minute Quadrangle, J. Devera, B. Denny, J. Nelson, R. Jacobson, J. McLeod, J. Aud, J. Hutmacher, and T. Young.

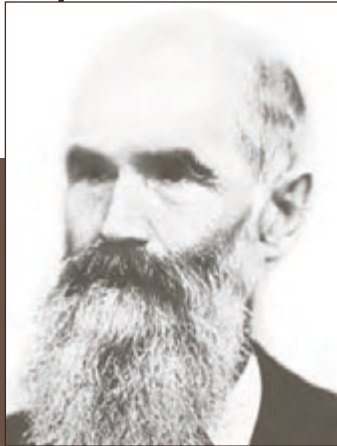
Curation and Management of the ISGS Paleontological Collections, R. Norby, D. Mikulic, and R. Hansen.

Geology (Bedrock and Surficial) of Williamson County, J. Nelson.

Geology of Illinois, D. Kolata, M. Leighton, J. McBride, D. Mikulic, J. Devera, Z. Lasemi, R. Norby, J. Nelson, R. Jacobson, A. Hansel, B. Seyler, B. Huff, B. Herzog, T. Larson, S. Panno, R. Berg, M. Chrzastowski, R. Bauer, R. Cahill, P. Weibel, M. Barnhardt, M. Miller, J. Miner, D. McKay, D. Larson, G. Dreher, T. Kemmis, W. Su, W. Roy, K. Hackley, B. Curry, H. Wang, C. Nimz, J. Steinfeldt, J. Hines, J. Hannah, P. Carrillo, M. Knapp, C. Briedis, D. Byers, and J. Dexter.

*As part of the preparations for the Survey's centennial celebration in 2005–2006, many ISGS staff members have contributed to a benchmark publication describing the many aspects of Illinois geology. The book will help interested members of the general public better understand the state's geology and importance. An overview of the Survey's history helps to illustrate the scope and significance of Survey contributions. All chapters have been written and submitted to the publishing section for editing, production, and printing. The publication is scheduled for release during the centennial period.*

Dr. A.H. Worthen,  
Director of  
the Survey,  
1858–1875,  
and State  
Geologist,  
1877–1888.



Geology of the Alton 7.5-minute Quadrangle, B. Denny, J. Devera, D. Grimley,

Z. Lasemi, R. Norby, E. Smith, J. Domier, J. Dexter, and P. Carrillo.

Geology of the Cache 7.5-minute Quadrangle, J. Nelson and J. Aud.

Geology of the Cairo 7.5-minute Quadrangle, J. Nelson and J. Aud.

Geology of the Cypress 7.5-minute Quadrangle, J. Nelson, J. Aud, and J. Devera.

Geology of the Elsah 7.5-minute Quadrangle, B. Denny, J. Devera, D. Grimley, Z. Lasemi, R. Norby, E. Smith, J. Domier, J. Dexter, and P. Carrillo.

Geology of the Grafton 7.5-minute Quadrangle, B. Denny, J. Devera, D. Grimley, Z. Lasemi, R. Norby, E. Smith, J. Domier, J. Dexter, and P. Carrillo.

Geology of the Vienna 7.5-minute Quadrangle, J. Nelson, J. McLeod, and J. Devera.

## Regional Study of Benoist Sandstone, H. Leetaru.

ISGS geologists used over 1,800 wireline logs to prepare regional structure and isolith maps of the Benoist over an area of 7,000 square miles. These maps characterize the geologic complexities of the reservoirs in six different Benoist oil fields, demonstrating the importance of stratigraphic knowledge to the trapping and recovery of oil from the Benoist sandstone. This Mississippian unit (formally known as the Yankeetown Sandstone outside the petroleum industry) has been a major oil-producing horizon in south-central Illinois for almost a century. The Benoist has also been used for natural gas storage since the 1960s. Information gleaned during this study should assist producers in realizing the numerous opportunities that exist for further exploration and development drilling.



Benoist reservoir sandstone, showing potassium feldspar grains undergoing degradation (A) and secondary porosity formed from dissolution of grains (B). Shell Oil Company, Hanseman No. 2 Well, depth 1,367 feet.

Revision of the Statewide Illinois Bedrock Geology Map, D. Kolata and D. Byers.

Silurian Biostratigraphy of Northeastern Illinois and Southeastern Wisconsin, R. Norby, D. Mikulic, and M. Kleffner (Ohio State University).

Surficial Geology of the Ames 7.5-minute Quadrangle, Monroe County, J. Devera, and G. Schofner.

Surficial Geology of the St. Jacob 7.5-minute Quadrangle, J. Devera, B. Denny, D. Grimley, A. Phillips, J. Aud, and J. Duncan.

Surficial Geology of the Worden 7.5-minute Quadrangle, Surficial Geology of Marine 7.5-minute Quadrangle, J. Devera, B. Denny, D. Grimley, A. Phillips, J. Aud, and J. Duncan.

## Coal

In order to answer increasing numbers of requests from the coal mining and coal bed methane industries for detailed maps, the ISGS has recently completed its county coal map series, which contains 1,203 maps. For each Illinois county where coal has been produced, the following information is presented: (1) thickness of major coal seams, (2) structural contours (topographic elevation of the coal seam), (3) depth of major coal seams below the ground surface, (4) aggregate coal thickness, and (5) sulfur and chlorine contents for mined seams (where data are available and applicable). These 1:100,000-scale maps are available as online PDF files and for sale as on-demand printed maps.

These maps have already been put to good use. In one instance, the **Illinois Mine Subsidence Insurance Fund (IMSIF)** requested up-to-date information about a Christian

From left: Scientists from the ISGS Coal Section, Thomas Moore, Joe Devera, Russ Jacobson, and Scott Elrick, examine the printed version of a few of the new 1:100,000 county coal maps. These maps will greatly improve the Survey's ability to provide information about coal mining and coal bed methane to the public.



County mine lying beneath an area where homeowners were experiencing problems with ground settling and movement. The newly updated ISGS county coal mine map was used to provide information to IMSIF that saved the insurance fund and the mining company the cost of additional geotechnical investigations and a potential lawsuit.

Along with colleagues from **Indiana and Kentucky geological surveys**, ISGS geologists are working to complete draft maps of the extent, thickness, and depth of the **Survant Coal**. This seam is important in the southeastern portion of the Illinois Basin. Mapping this major coal seam is needed to determine its potential as a reservoir for carbon sequestration. This mapping project is part of a larger project to reduce carbon emissions to the atmosphere by storing them below ground.



Chris Korose, with a map of the **Survant Coal**.

Cleat and Other Fracture Development in Illinois Coals, I. Demir and D. Morse.

Coal Bed Methane Exploration Risk and Means for Its Mitigation, T. Moore.

Development of Geology of Coal Bed Methane Short Course, T. Moore.

Maintenance of Coal Resource and Mine Data, OMM, T. Moore, A. Louchios, S. Elrick, C. Korose, T. Moore, and R. Jacobson.

7.5-minute Quadrangle Mined-Out Area Studies, C. Chenoweth, J. Obrad, and A. Meyers.

National Coal Resources Data System, T. Moore, S. Elrick, and R. Jacobson.

## Energy and Environmental Engineering

*ISGS engineers have successfully test fired biosolids material with coal at the Pennsylvania State Energy Institute test facility. Although the mixture, composed of dewatered sewage sludge, coal wastes, and limestone, has a much lower energy content than coal alone, the amount of greenhouse gas emissions is also much lower. If the tests continue to be successful, these waste materials might become significant new sources of energy. The project is co-sponsored by the **Illinois Clean Energy Community Trust** and the **Illinois Department of Commerce and Economic Opportunity**.*

A Feasibility Study of Carbon Sequestration Utilizing Ammonium Bicarbonate in Fly Ash Amended Soil, J. Chou, M. Chou, and J. Stucki (DNRES, UIUC).

Demonstration of ISGS Washer Retrofit at Galatia Mine Coal Processing Plant, L. Khan, C. Manrique, and W. Roy.

Demonstration Study of High Sulfur Coal Combustion in Oxygen-enriched Flue Gas, M. Rostam-Abadi, S. Chen, Y. Lu (UIUC/ISGS), K. Henry, Air Liquide, and McDermott Technologies.

Fabrication of a Scaled-up ISGS Intelligent Filter Press, L. Khan, C. Manrique, and W. Roy.

Manufacturing Autoclaved Aerated Concrete from Illinois Coal Fly Ash, J. Chou, M. Chou, J. Bukowski (UIUC), V. Patel, and ICCI. Project manager.

Manufacturing Fired Bricks with Class F Fly Ash from Illinois Basin Coals, M. Chou, J. Chou, V. Patel, T. Moore, S. Bhagwat, J.W. Stucki (UIUC), N. Shaffer (Indiana Geological Survey), and industrial partners.

Production of Mercury Oxidation Catalysts, M. Rostam-Abadi, Y. Lu (UIUC/ISGS), and K. Henry.

*In a project for **URS** (Austin, Texas), sponsored by the **U.S. Department of Energy**, ISGS researchers are testing a carbon-based catalyst that may help power plants use their flue gas desulfurization (FGD) scrubbers to capture most of the mercury in their flue gas, thus preventing the mercury from reaching the atmosphere. The catalyst materials promote the conversion of elemental mercury to a positively charged, water-soluble form that is easily*

*captured by the wet lime or limestone FGD process. The **MicroEnergy Systems** pilot-scale facilities (Oakland, Maryland) were used to produce several hundred pounds of*



*From left: Yonqi Lu, Massoud Rostam-Abadi, and Scott Chen with “big blue,” the machine used for pilot-scale testing of catalysts to convert elemental mercury to a form that can be removed from flue gas.*

*the catalyst for fabrication into fixed-bed porous filters. Initial data suggest that the catalyst can convert up to 97% of the available elemental mercury, which should be good news for utilities equipped with wet FGD scrubbers.*

Studies of Advanced Mercury Sorbents and Technologies, M. Rostam-Abadi, S. Chen, M. Rood (UIUC), R. Chang (IPRI), URS Corporation, ADA Corporation, and K. Henry.

Studies of Coke Deposition and Prevention for TRAGEN Process, S. Chen, M. Rostam-Abadi, R. Ruch (Isotech, Inc.), and Y. Lu.

## Geochemistry

Chemical and Mineralogical Properties of Illinois Soils, G. Dreher, L. Follmer, and J. Steele.

Contaminant Transport Through a Field-scale Earthen Liner, I. Krapac and T. Stark (UIUC).

Determining Lead Exposure Sources in Northwestern Illinois, J. Risatti, Z. Lasemi, L. Savage, E. Mehnert, R. Finley, and W. Shilts.

*ISGS scientists are working with the Illinois Department of Public Health and Jo Daviess County Health Department to determine the sources of the high lead concentrations found in the blood of Galena area children. The area is known for its history of lead and zinc mining, and the area soil contains naturally high levels of lead. The Survey recently acquired mine maps and other historical records from the last active mining company in the area. Those archives are being used in conjunction with other ISGS data to produce an updated digital map of the known lead and zinc mining sites in the county. This information should provide valuable information needed to sort out the source of lead contamination in the area.*

*Recently acquired maps are being examined by Zak Lasemi, Leslie Savage, and Jim Risatti, who are working with the Illinois and Jo Daviess County health departments to map lead and zinc mining sites in the county.*



Illinois Basin Oils Chromatographic Database, G. Salmon.

Modeling Groundwater Flow and Contaminant Transport at a Swine Confinement Facility, I. Krapac, D. Walker (ISWS), Y. Lin (ISWS), and A. Valocchi (UIUC).

Monitoring the Quality of Groundwater Impacted by Swine Production Facilities, I. Krapac, J. Chou, W. Roy, M. Meyer (USGS), R. Mackie (UIUC), J. Chee-Sanford (UIUC), and S. Koike (UIUC).

Organic Compounds in Sediments from the Grand Calumet River–Lake Michigan to Lake George, G. Salmon, R. Cahill, and M. Unger.

Possible Geological-Geochemical Controls of Ammonium in Groundwater, W. Roy, I. Krapac, and J. Glessner.

Sediment Quality and Sedimentation Rates in Backwater Lakes along the Illinois River, R. Cahill, J. Steele, G. Salmon, and R. Henderson.

Unified Geochemistry Database Development—Planning, J. Steele, G. Salmon, J. Risatti, S. Denhart, B. Stiff, H. Wang, and A. Lecouris.

## Industrial Minerals

*At the request of the Champaign County Forest Preserve District's Citizen's Advisory Committee, the ISGS is preparing a report on the geology and hydrogeology of the River Bend Forest Preserve. The park covers part of the reclaimed land from a sand-and-gravel mining operation along the banks of the Sangamon River near Mahomet. The report will include information about the regional geologic setting, relationship of the site to the Sangamon River, river level fluctuations and their effects on the water level in the lake formed by dredging of sand and gravel deposits, long-term stability of the lake beach and the banks of the lake and river, susceptibility of the site to pollution from surface water runoff, and other environmental issues.*

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*"I wanted to take this opportunity to thank the Illinois State Geological Survey, and specifically Dr. Randall Hughes, for the invaluable assistance given to the State of Illinois on [a legal matter.] Dr. Hughes worked very closely with Richard Lange from the Illinois Environmental Protection Agency and me on this case. Not only did he perform an investigation of the geology of the . . . site involved . . . but [he] also served as a reference source in interpreting existing data and the opposing opinions. His professionalism and integrity were evident throughout the investigation, in his report to the Court of Claims, his deposition and at trial. . . . I believe that Dr. Hughes' work made a significant impact."*

*—Jacqueline K. Williams  
Assistant Attorney General*

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A Research Report on the Role of Aggregates in the Illinois Economy, S. Bhagwat.

Aggregate Resource Mapping in the St. Louis Metro East Region of Illinois: Cahokia and Columbia Quadrangles, Z. Lasemi and R. Norby.

Association of American State Geologists U.S. Silica Field Trip, T. Kemmis, K. Keith, J. Dexter, and J. Steinfeldt.

Zak Lasemi (left) and Pius Weibel in Peoria County collecting samples for analysis. The two are looking for shales and fireclays that would be suitable for use with combustion by-products from power plants.



Clay and Shale Resources of Peoria County, Z. Lasemi, K. Keith, P. Weibel, and H. Leetaru.

*With funding from the **Illinois Clean Coal Institute**, ISGS researchers have been mapping in the Peoria area, looking for potential shale and fireclay resources in the vicinity of power plants that provide coal fly ash by-product to make high-quality fired bricks at a proposed new manufacturing plant. To be successful, the plant requires low-sulfur, non-calcareous shale and fireclay resources in the vicinity. Because fly ash acts like sand and silt grains in the brick mixture, the most suitable shale is finer grained than needed for normal brick production. In addition to particle size, other considerations are overburden thickness above the shale, thickness of the shale itself, quantity of shale, undesirable components, and transportation cost. Several promising areas were delineated. Opening a new brick plant near the utility would use an otherwise wasted resource, fly ash, and create new jobs, benefitting the local and state economy. ISGS geologists are mapping shale resources and showing them on maps with the locations of municipalities, water bodies, parks, wetlands, previously mined areas, and other features.*

Compilation of Illinois Gravel Mineralogy, T. Kemmis and J. Masters.

Economics of Underground Mining of Limestone, S. Bhagwat, Z. Lasemi, and M. Dunn (CONCO Western Mining Co.).

Fox River Valley Reconnaissance, T. Kemmis, J. Dexter, A. Hansel, and W. Dey.

Green River Lowland Reconnaissance, T. Kemmis, A. Bettis (University of Iowa), and R. Anderson.

Illinois River Valley Reconnaissance, T. Kemmis, E. Hajic, K. Keith, A. Stumpf, S. Koenig, and R. Hughes.

Inventory of Illinois Limestone Resources for Flue-gas Desulfurization Units, Z. Lasemi, R. Norby, G. Dreher, J. Steele, S. Bhagwat, H. Leetaru, M. Rostam-Abadi, and D. Mikulic.

*New coal-fired power plants are being planned in southern Illinois, and stone will be needed for scrubbers in those plants. As part of this planning, ISGS researchers have been asked to*



Rod Norby (left) and Zak Lasemi study core samples of high-quality limestone with the potential to be used as scrubbers in new coal-fired power plants in the southern Illinois region.

compile an inventory of Illinois limestone resources for the **Illinois Clean Coal Institute**. ISGS researchers have collected more than 100 samples from quarries in the state's southern half and analyzed them chemically and mineralogically to determine their quality and suitability for use in capturing sulfur in scrubber systems of coal-fired power plants. The researchers are now sampling and analyzing limestone from additional quarries. After these steps are completed, researchers will prepare maps showing the locations of scrubber stone resources for the southern part of the state.

Locating Fireclays and Shales near Illinois Power Plants for Fly Ash Bricks, K. Keith, Z. Lasemi, P. Weibel, and H. Leetaru.

Phase II of a shale and clay resource mapping project, funded by the **Illinois Clean Coal Institute**, is under way. Geologists have compiled well records and Geographic Information Systems (GIS) data on the shale resources for the areas surrounding two power plants, one near Danville and the other near Marion. The Indiana Geological Survey helped provide well record data for the portion of the area that extended into Indiana. All of these data are

being used to develop maps showing where



From left: Karan Keith, Zak Lasemi, Chris Majerczyk, and Scott Koenig are developing maps showing overburden materials in order to pinpoint locations suitable for surface mining of shale and clay that can be used as a component in bricks made with coal fly ash by-product.

*the overburden materials are thin enough to permit surface mining of clay or shale resources suitable for making fired bricks in combination with fly ash produced by the power plants.*

Regional Cross Section of the Mississippian Units in the Aggregate Resource-rich Area of Southwestern Illinois, Z. Lasemi and R. Norby.

Silurian Geology of West-Central Illinois, D. Mikulic, R. Norby, J. Kluessendorf (University of Wisconsin), and T. Butcher (University of Portsmouth).

Subsurface Silurian Lithostratigraphy of Northeastern Illinois, D. Mikulic.

## **Oil and Gas**

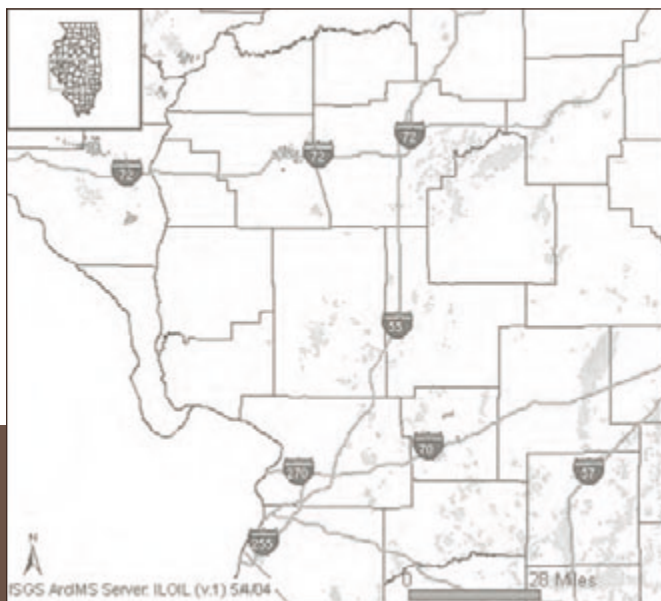
Annual Report of Oil Field Statistics, B. Huff and R. Lipking.

Characterization and Regional Analysis of Cypress and Pennsylvanian Sandstone Reservoirs, B. Seyler, J. Grube, B. Huff, D. Byers, and J. Steinfeldt.

Development of Color-Coded Pay Zone Maps and New Structure Maps, S. Gustison, J. Crockett, and P. Johaneck.

*ISGS staff have produced new digital oil and gas development maps showing current well status. The maps are derived from information stored in the Survey's Oracle well database of more than 180,000 Illinois wells. Data on producing formations for about 83,000 wells have been updated, integrated with the well data files, and used to produce the color-coded pay zone maps. Now users can visually recognize reservoir trends and geometries within individual formations. Users also can digitally project these characteristics onto an area being considered for possible development. The digital format allows map data to be updated more easily, increases analytical flexibility, and increases data delivery options.*

*Portion of online state-wide map showing oil field locations ([isgs.uiuc.edu/website/iloil\\_arcmap/viewer.htm](http://isgs.uiuc.edu/website/iloil_arcmap/viewer.htm)).*



Geographic Information System Approach for Play Portfolios in the Illinois Basin, B. Seyler, B. Huff, J. Grube, J. Cokinos, S. Gustison, R. Krumm, D. Keefer, A. Metcalf, A. Faber, A. Lecouris, C. Korose, D. Nelson, and R. Lipking.

*The Illinois Survey now has powerful analytical tools available to the public on its Web site, facilitating access to information needed by companies to increase production of critical oil resources in the Illinois Basin. For more than a century, oil and gas have been produced commercially in Illinois, but estimates suggest that large quantities of oil still remain in*



Alison Lecouris (seated) demonstrates the ease of use of the online oil and gas maps to (from left) Chris Korose, Steve Gustison, Rob Krumm, and Sheena Beaverson.

Illinois oil fields and are potentially recoverable using current technology. The oil and gas remain because complex development histories, multiple stacked pay zones, and commingled production make it difficult to apply enhanced recovery strategies.

The ISGS, funded by the **U.S. Department of Energy**, has used the statewide oil and gas Oracle database to develop a series of interactive oil and gas base maps with well locations color-coded by producing horizon. The data allow the user to view single or multiple horizons, as needed. A second series of interactive maps identify underdeveloped areas by reservoir quality and specific pay characteristics. Access to these map data greatly increases the ability of companies to analyze all of the pay horizons within Illinois.

Illinois Coalbed Methane (Combined IDCEO and University of Kentucky/Department of Energy), D. Morse, I. Demir, and T. Moore.

*I recently visited the ISGS Oil and Gas Department in Champaign and spent three days accumulating various information relative to the Illinois Basin. The Survey staff was more than accommodating to say the least. Your staff not only...were extremely knowledgeable but made sure to find the information I needed [and] suggested additional information germane to the subject. It was not only one individual I came into contact with but everyone, e.g., Randy Lipking, Tonia Vaughn, Le Ann Benner, Joan Crockett, Bobby Harrison. The congenial and pleasant attitude I encountered was truly amazing and a credit to your Department. ...On a scale of 1 to 10, your staff is definitely a ten.*

—Ross Miller  
(by e-mail)

Mt. Simon Gas Storage Characterization—Department of Energy, D. Morse and H. Leetaru.

NATCARB (formerly MIDCARB, Mid-Continent Interactive Carbon Atlas and Relational Database), B. Seyler, A. Lecouris, C. Korose, B. Huff, J. Grube, R. Lipking, and P. Johanek.

Oil and Gas Data Update and Drilling Report in GIS Format, B. Huff and S. Gustison.

Petroleum Technology Transfer Council—Department of Energy, D. Morse, S. Gustison, B. Huff, J. Crockett, B. Seyler, P. Johanek, and J. Grube.

## Environmental Geoscience Center

### Applied Geophysics

Enhance ISGS Borehole Geophysics Program, T. Young, A. Dixon-Warren, C. Blakley, M. Mushrush, A. Lecouris, J. Aud, C. Wilson, C. Stohr, and A. Hansel.

*Improved seismic measurements and methodology are supporting several Survey mapping projects. In order to convert seismic profiling data into accurate portrayals of the subsurface, it is essential to know the velocity of seismic waves that travel through earth materials. Downhole measurements of seismic velocities of glacial materials are now being made wherever possible by scientists in the Applied Geophysics Section to enhance borehole information obtained by drillers. These measurements have shown that, in many places, the repeated glacial advances strongly compacted the tills, drastically increasing the seismic wave velocity through these layers.*

*This knowledge greatly improves the accuracy of estimates of depth to bedrock and depth to layer based on seismic velocity. Data from seismic profiles are also useful for calculating the degree to which materials may amplify seismic waves from an earthquake and, thus, help communities and agencies plan for earthquake effects. New signal processing routines, developed at ISGS during the past field season, are significantly faster and clearer than those previously used.*

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*“Thanks again for a great program. We really enjoyed [Tim Larson’s earthquake talk at the Illinois State Museum] having you here. . . . Our total was 146 . . . you could even say 150 because I think we may have missed a few that came in right at the end. As promised, here is a list of the schools that were represented at today’s program: Lincoln Magnet School, Springfield; Jefferson Middle School, Springfield; Grant Middle School, Springfield; Washington Middle School, Springfield (the largest group); Rochester Junior High, Rochester; Williamsville Junior High, Williamsville; West Lincoln Broadwell Elementary School; Lincoln Edinburg Junior High, Edinburg; Little Flowers School, Springfield; Carol Catholic School, Springfield.”*

*Jennifer Kuehner  
Assistant Curator of Education  
Illinois State Museum*

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Geophysical Exploration of Sand and Gravel Aquifers for Municipal Water Supplies, T. Young, C. Blakley, and M. Mushrush.

*Survey geologists continue their work around the state, conducting geophysical explorations on behalf of communities seeking new supplies of groundwater. Some of their success stories are told here.*

*Following an extensive electrical earth resistivity (EER) survey conducted by ISGS staff, and extensive communication with stakeholders, the **Clark-Edgar Rural Water District** drilled three successful test holes in an area along the Wabash River floodplain near Darwin, Illinois. The test holes proved the existence of a significant aquifer in the*



Scientists Curt Blakley and Tim Young taking GPS measurements along the Indiana side of the Wabash River floodplain as part of a project to help Paris, Illinois, find an additional municipal water supply.

area, confirming the ISGS information and convincing the water district officials to continue development of the site.

Scientists from ISGS and **Illinois State Water Survey (ISWS)** have been helping the city of Paris, Illinois, search for a new water supply. A multiple-year study in Illinois was unsuccessful, but, with the cooperation of the Indiana Geological Survey, ISGS scientists conducted a 70-station EER survey of the deposits in the Wabash River floodplain on the Indiana side of the river. Glacial outwash deposits that underlie the river floodplains commonly are prolific sources of groundwater. The scientists are continuing discussions with officials of Paris, Illinois, about drilling test holes at a site along the Wabash River in western Indiana. The site is a protected wetland about 14 miles from Paris. All required permits have been obtained, and two test holes drilled in March 2004 revealed the presence of an exceptionally good aquifer. The scientists are providing additional technical advice about procedures for developing the site.

The Village of Gifford successfully completed a new municipal well based on the results of an ISGS EER survey conducted in 2001. The new well produces over 200 gallons per minute, which is double the capacity of the village's existing wells. The EER survey was requested by Sodemann & Associates of Champaign after numerous unsuccessful tests had been drilled near the existing municipal wells. Test drilling, geophysical logging, and an ISWS aquifer test all contributed data that led to this successful outcome for the village.



André Pugin, ISGS geophysicist, in the process of collecting seismic reflection data about the Mahomet Sand. The landstreamer, an ISGS innovation, allows these descriptive data to be collected faster and more effectively, with fewer staff, than previous collection technology.

Illinois Board of Higher Education Geophysics Mapping, A. Pugin, T. Larson, S. Sargent, R. Berg, and M. Dodd.

*With funding from the **Illinois Board of Higher Education**, ISGS geologists were able to work with **Illinois State University** students to collect about 50-square miles of high-resolution seismic reflection data pertaining to the water-bearing Mahomet Sand. The scientists were investigating whether the ISGS-developed landstreamer technique could provide the images necessary to visualize geologic structures clearly. The landstreamer allowed the scientists to acquire data faster, with fewer staff, greatly lowering the cost of acquisition. These data were calibrated and used to produce three-dimensional views of a discontinuity in the Mahomet Sand. The Mahomet aquifer supplies much of the drinking water for the central region of the state, and the new information confirmed the existence of a major hydraulic window connecting the surface water with the lower Mahomet Sand aquifer. This aquifer was originally thought to be fully protected from surface contaminants.*

Mine-Void Detection Using Multi-Component Reflection Land Streamers, T. Larson, A. Pugin, S. Sargent, and P. Padgett (Black Beauty Coal Company).

Seismic Reflection Survey in the Ohio River, T. Larson, A. Pugin, S. Sargent, and J. McBride (Brigham Young University).

## **Engineering and Coastal Geology**

American Association of State Geologists Geology Excursion, M. Chrzastowski, S. Greenberg, and J. Dexter.

Chicagoland Poster, M. Chrzastowski, P. Carrillo, C. Abert, C. Nimz, and J. Steinfeldt.

CUSEC State Geologists Mapping Efforts in the Midwest, R. Bauer and W. Su.

*The ISGS has been coordinating a project by the Central U.S. Earthquake Consortium (CUSEC) State Geologists to map the seismic behavior of soils in the eight states surrounding the New Madrid Seismic Zone, which extends from northeastern Arkansas to near the southern tip of Illinois. This regional map, and page-size maps showing earthquake epicenters and observed shaking effects and damage caused by past earthquakes, were used by officials of the First Army to plan the scenarios for a regional disaster response exercise during spring 2004.*

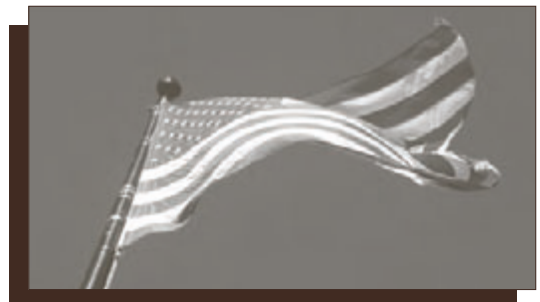
*As part of this effort, the **U.S. Geological Survey** has accepted a proposal by the CUSEC State Geologists to describe soil profiles and measure shear wave velocities and other soil properties in the vicinity of St. Louis, Missouri, and Evansville, Indiana. These data will help researchers develop three-dimensional maps of the earth materials and determine how the soils will amplify earthquake ground motions.*

Engineering Geology Database, W.-J. Su, R. Bauer, C. Stohr, and A. Lecouris.

National Earthquake Conference Planning and Field Trip, R. Bauer.

## **Groundwater Geology**

*In response to a request from the **Lieutenant Governor's Office**, the ISGS provided information to the **Illinois Department of Public Health** about potential groundwater sources near the home of the family of a soldier stationed in Iraq whose well had gone dry. The*

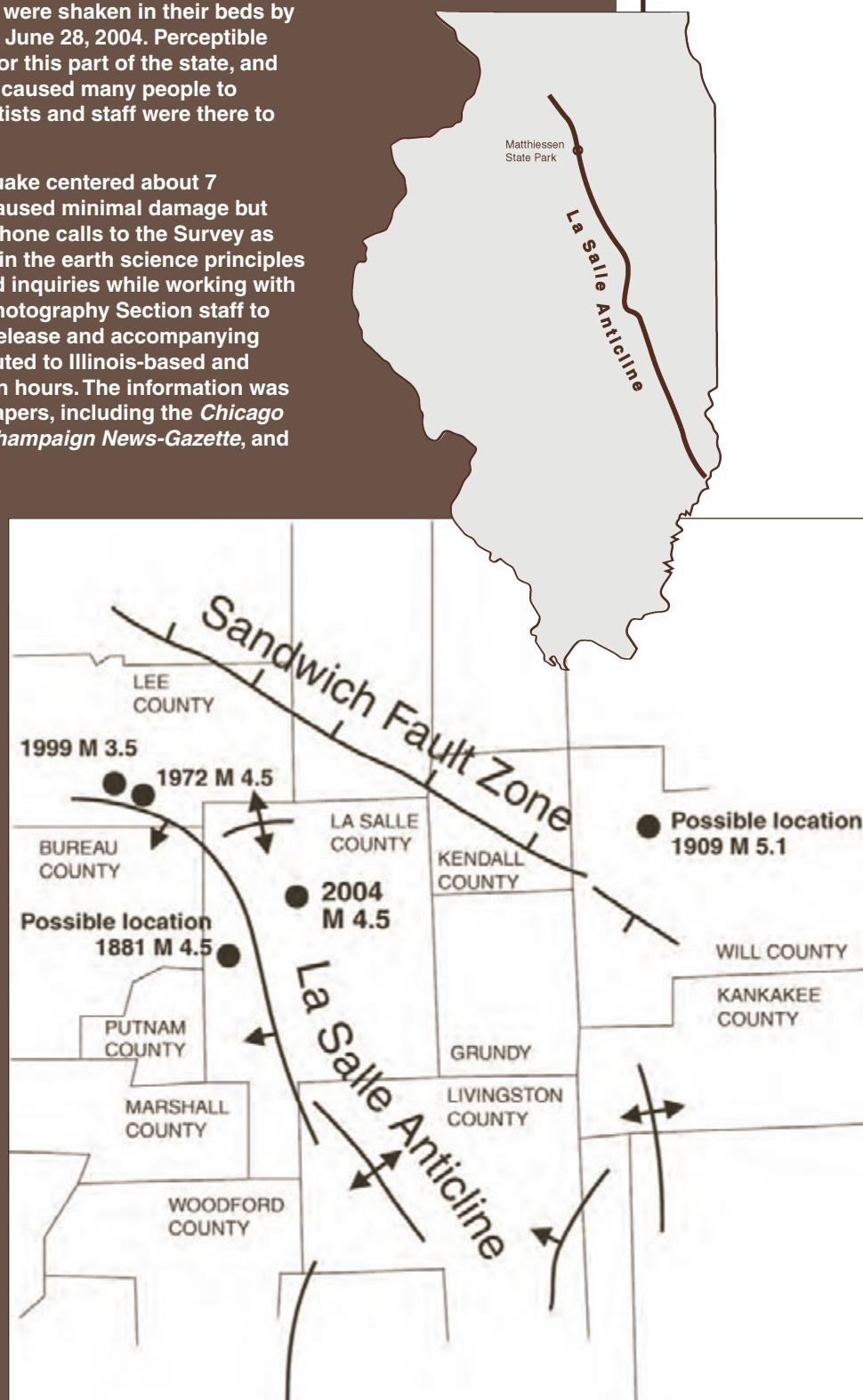


## Responding to Public Information Needs after Earthquake

Northern Illinois residents were shaken in their beds by an earthquake at 1:10 a.m. June 28, 2004. Perceptible earthquakes are unusual for this part of the state, and the early morning temblor caused many people to ask questions. ISGS scientists and staff were there to answer them.

The magnitude 4.5 earthquake centered about 7 miles east of Troy Grove caused minimal damage but generated numerous telephone calls to the Survey as the media worked to explain the earth science principles involved. ISGS staff fielded inquiries while working with Publishing, Design, and Photography Section staff to quickly generate a press release and accompanying graphics that were distributed to Illinois-based and national news media within hours. The information was featured in several newspapers, including the *Chicago Tribune*, *USA Today*, the *Champaign News-Gazette*, and the *Peoria Journal Star*.

The release helped scientists correct early misconceptions about what caused the earthquake and provided accurate information about the temblor's epicenter in the side of a bedrock fold called the LaSalle Anticline. Scientists also used the release to explain the anticline's relationship to the Illinois Basin, a bowl-shaped depression that underlies a total of about 60,000 square miles in Illinois and adjacent parts of Kentucky and western Indiana. The graphics helped readers understand where the earthquake had occurred, the epicenters of past Illinois earthquakes, and the geologic structures involved in the June 28 quake.



*Lt. Governor's office arranged with the **Illinois Association of Groundwater Professionals** and **Reynolds Well Drilling** to donate the drilling and new well supplies. ISGS scientists answer hundreds of queries about groundwater supplies and related issues annually. nmjmmmm*

A Critical and Statistical Evaluation of Characterization Methods for Sites Contaminated through Multiple Discrete Spills, D. Keefer.

A Statewide Monitoring Network to Evaluate Pesticide Contamination of Groundwater in Illinois—Installation, Sampling, and Data Analysis, E. Mehnert, W. Dey, D. Keefer, S. Wilson (ISWS), H.A. Wehrmann (ISWS), and C. Ray (University of Hawaii).

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*"Thank you [Bob Vaiden] very much for your excellent presentation on Illinois geological history to the DuPage County Groundwater Workshop for Teachers. . . . The teachers were very impressed with your professional presentation, knowledge of geology, and teaching methods. Thanks also for staying and helping with the building of the mini-profiles and the groundwater flow models. For once, the teachers [had] sufficient time to discover the features of the groundwater models by playing with them. . . . As usual, GREAT WORK! Your Build Illinois presentation provided an excellent foundation for the rest of the class."*

—Harry Hendrickson  
Groundwater Education Coordinator  
Illinois Department of Natural Resources  
(by e-mail)

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Build Illinois Video Production, R. Vaiden, S. Greenberg, J. Dexter, and D. Byers.

Dating of Cave Sediments and Speleothems, S. Panno, B. Curry, K. Hackley, and C. Lundstrom (UIUC).

Development of a Statewide Database of Hydraulic Conductivity Values from Quaternary Units in Illinois, J. Sieving, E. Smith, D. Sieving, A. Lecouris, and S. Denhart.

Development of Three-dimensional Visualization Application, D. Keefer and F. Dorothy.

Differences in Water Quality Between the Upper and Lower Reaches of Illinois Caverns: Potential Effects on Populations of *Gammarus acherondytes*, S. Panno, K. Hackley, H. Hwang, S. Taylor (INHS), and W. Kelley (ISWS).

Estimation of Groundwater Recharge in Northeastern Illinois, E. Mehnert, P. Kesich (Fermi Laboratory), T. Kemmis.

Evaluation of Analytical Element Groundwater Flow Modeling to Improve Geologic Mapping, E. Mehnert, W. Dey, Y.F. Lin (ISWS), and D. Walker (ISWS).

Groundwater Resources and Peaker Power Plants in Illinois, D. Larson.

Illinois-American Water Corporation, Champaign, Illinois, Groundwater Chemistry and Microbiology, S. Panno.

*ISGS geologists responded to a request by Illinois-American Water Corporation (I-AWC) to examine their high-capacity wells in the Mahomet Aquifer at Champaign. Over the*



*From left: Tim Young, Keith Hackley, Ed Mehnert, and Sam Panno examine materials from Illinois-American Water Corporation wells in Champaign in order to help explain why the wells have been losing capacity and to recommend ways the company might be able to rehabilitate the wells.*

*three past decades, specific capacity of the wells had progressively decreased. Using data obtained from two new boreholes drilled to bedrock, monitoring wells, and groundwater samples analyses, the scientists proposed a model to explain the decreased specific capacity. They concluded that iron-depositing bacteria had produced biofilms on the well screens that trapped transported mineral fragments, clay minerals, and newly precipitated calcite crystals. These three components apparently combined to produce an insoluble scale on the well screen and potentially in the gravel pack and adjacent aquifer. Based on these findings, the scientists suggested possible ways that I-AWC could rehabilitate the wells.*

Indicators of the Origin of Sodium and Chloride in Natural Waters, S. Panno, K. Hackley, S. Greenberg, H. Hwang, and I. Krapac.

ISGS Geoactivities Series: Paleopacket, R. Vaiden, C. Nimz, M. Knapp, and S. Greenberg.

Mapping and Characterization of Sand and Gravel Deposits for a Supplemental Groundwater Supply for the Village of Elburn, Kane County, W. Dey, A. Pugin, T. Young, H.A. Wehrmann (ISWS), and R. Olsen (ISWS).

Mass Flux of Nutrients (Nitrogen and Phosphorus) in Shallow Groundwater, E. Mehnert, T. Holm (ISWS), R. Sanford (UIUC), T. Johnson (UIUC), and H. Hwang.

Principle Aquifers of Illinois Statewide Map, R. Rice, R. Brower, M. Mushrush, A. Lecouris, S. Denhart, and C. Abert.

Regional Groundwater Assessment of Portions of DuPage, Kendall, and Will Counties, E. Smith, R. Vaiden, A. Stumpf, and D. Grimley.

Regional Groundwater Assessment of the Metro East Region, E. Smith, R. Vaiden, J. Devera, and A. Phillips.

Sinkhole Density, Bedrock Topography, Water Table, and Drift and Loess Thickness Maps of the Columbia, Waterloo, and Renault Quadrangles, S. Panno, P. Weibel, J. Devera, B. Denny.

The Effect of Land Use on Shallow Groundwater Flow and Quality, W. Dey and E. Mehnert.

The Hydrochemistry of Illinois, S. Panno, K. Hackley, W. Kelly, and J. Steele.

Water Resource Investigation for Kane County, Illinois, W. Dey, J. Sieving, B. Curry, C. Abert, D. Keefer, M. Mushrush, A. Davis, D. Byers, P. Carrillo, C. Nimz, J. Steinfeldt, S. Meyer (ISWS), and D. Walker (ISWS).

## Isotope Geochemistry

*A recent flood in Coles County destroyed part of a levee along the Embarras River, exhuming several large buried tree trunks, including one approximately 48 feet long and 4 feet in diameter.*

*The ISGS radiocarbon dating laboratory, in response to a request for information, found that the largest tree was about 280 to 350 years old, although such recent dates are subject to large errors. Some of the trees showed evidence of having been cut with a European-style saw. The geologists suggested, based on their observations, that the trees had become lodged in a log jam in the river and then were buried by about 4 feet of sediment. About 100 years ago, the levee was constructed on the land surface above the buried log jam. A retired state climatologist will examine the tree rings to interpret the annual climate record in central Illinois over the past few hundred years.*

Calcified Rootlets and the Significance of Terrestrial Carbon Cycles in Response to Climate Change in Illinois during the Last Glaciation, H. Wang and S. Greenberg.

Determination of the Dominant Sources of Nitrate in Wells and Springs of the Sinkhole Plain Using Nitrogen and Oxygen Isotopes, K. Hackley, S. Panno, H. Hwang, P. Carrillo, J. Steinfeldt, and C. Nimz.

Effect of Urban Growth on Groundwater Quality in McHenry County Based on Chemical and Isotopic Assessment, H. Hwang, K. Hackley, and S. Panno.

Effects of Land Application of Untreated and Treated Swine Slurry on Crop Production and Subsurface Water Quality, K. Hackley, S. Panno, H. Hwang, and W. Kelly (ISWS).

Investigation of the Age of Recharge of Groundwater to the Mahomet Valley Aquifer Using Geochemical Techniques, K. Hackley, S. Panno, and P. Carrillo.

Isotope Evidence of Long-term El Niño/Southern Oscillation Cycles in Illinois During the Last Glaciation, H. Wang.

*From left: Donald Ochs (landowner), Bill Eaton, Wayne Wendland, Jerome Kocher, and ISGS scientists Leon Follmer and Hong Wang pose with an exhumed tree trunk determined by radiocarbon dating to be between 280 and 350 years old.*



Loess Stratigraphy and Uranium Series Dating in Southern Illinois, H. Wang, L. Follmer.

Mass Flux of Nutrients (Nitrogen and Phosphorus) in Shallow Groundwater—Assessment of Denitrification in Shallow Groundwater by Isotopic Methods. H. Hwang, and T. Johnson (UIUC).

The Application of Nitrogen and Oxygen Isotopes of Nitrate to Identify the Sources and the Degree of Denitrification of Nitrate Levels in Illinois Groundwater, K. Hackley, H. Hwang, P. Carrillo, and G. Roadcap (ISWS).

### **Quaternary Geology**

Aquifer Sensitivity Map of the Crystal Lake 7.5-minute Quadrangle, B. Curry, M. Barrett, and J. Domier.

Bedrock Topography of the Collinsville 7.5-minute Quadrangle, A. Phillips, M. Barrett, and P. Carrillo.

Bedrock Topography of the Crystal Lake 7.5-minute Quadrangle Map, B. Curry, M. Barrett, and J. Domier.

Bedrock Topography Map of the Dunlap 7.5-minute Quadrangle, P. Weibel and M. Barrett.

Bedrock Topography Map of the Oakhill 7.5-minute Quadrangle, P. Weibel and M. Barrett.

Bedrock Topography of the Spring Bay 7.5-minute Quadrangle, P. Weibel, A. Stumpf, M. Barrett, and P. Carrillo.

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*“Recently Ardith Hansel of your agency presented a program on glaciers and their impact on northeastern Illinois. It was excellent and very much appreciated by the audience. It was sponsored by our agency, the St. Charles Park District in collaboration with the Kane County Forest Preserve and the Fox Valley Park District.*

*... I have dealt with Ardith on several occasions and found her to be exceptionally knowledgeable and eager to share what she knows. She has presented for us before and also given me advice several times on the content of interpretative signs. I just wanted you to know how much we appreciate having someone like Ardith available and willing to work with us.”*

*—Mary Ochsenschlager  
Assistant Superintendent of  
Natural Resources and Interpretative Services  
St. Charles Park District  
St. Charles, Illinois*

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Clay Mineral Database, M. Killey, H. Glass, and D. Sieving.

Crystal Lake 7.5-minute Quadrangle Data Point Map, B. Curry, M. Barrett, and J. Domier.

Data Point Map of the Spring Bay 7.5-minute Quadrangle, P. Weibel, A. Stumpf, M. Barrett, and P. Carrillo.

Delineation of Hydric Soils by Magnetic Susceptibility, D. Grimley, J. Dawson (UIUC, NRES), and D. Liebert (Urbana Park District).

Drift Thickness of the Crystal Lake 7.5-minute Quadrangle Map, B. Curry, M. Barrett, and J. Domier.

Drift Thickness of the Dunlap 7.5-minute Quadrangle, P. Weibel and M. Barrett.

Drift Thickness of the Oakhill 7.5-minute Quadrangle, P. Weibel and M. Barrett.

Drift Thickness of the Spring Bay 7.5-minute Quadrangle, P. Weibel, A. Stumpf, M. Barrett, and P. Carrillo.

Engineering Geology of the Collinsville 7.5-minute Quadrangle, A. Phillips, M. Barrett, and P. Carrillo.

Geologic Mapping of the Libertyville 7.5-minute Quadrangle (STATEMAP), A. Dixon-Warren, M. Barnhardt, M. Barrett, C. Stohr, A. Stumpf, and B. Stiff.

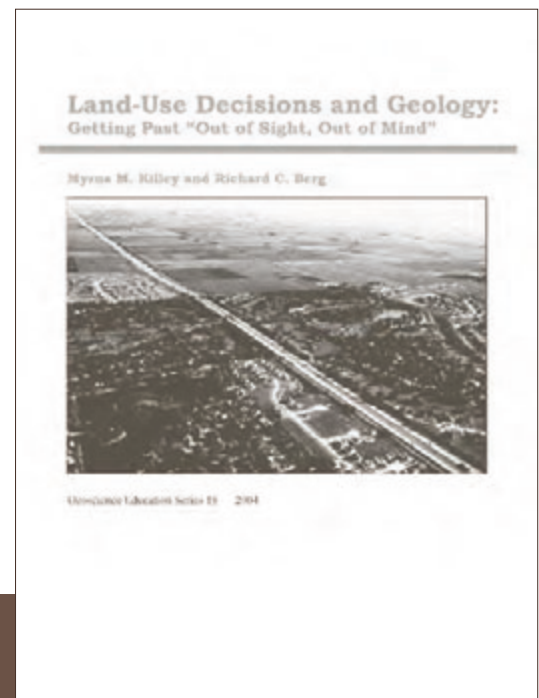
Geologic Maps (4) for the Marengo South Quadrangle, McHenry, DeKalb, and Kane Counties, B. Curry, M. Barrett, and J. Domier.

GeoScience Education Series publication, Groundwater: A Vital Illinois Resource, M. Killey, D. Larson, M. Knapp, J. Steinfeldt, and C. Nimz.

GeoScience Education Series publication, Land-Use Decisions and Geology: Getting Past "Out of Sight, Out of Mind", M. Killey, D. Berg, M. Knapp, J. Steinfeldt, and C. Nimz.

*This volume wraps up a three-part series beginning with Myrna Killey's Illinois' Ice Age Legacy and Groundwater: A Vital Illinois Resource. Building on the information presented in those two books, this third volume shows how understanding a location's geologic framework and contamination potential can help society make safer, more cost-effective decisions about land use. The information in all three volumes should be very useful in helping the public understand how the state's large population and its industrial and agricultural bases impact the environment.*

*Urban development spreads over prime and unique farmland in Champaign County.*



Glacial/Quaternary Geology Web site, A. Hansel, M. Mushrush, and D. Byers.

Illinois River Basin Restoration Project: Watershed and Pool Assessments, A. Phillips, L. Smith, G. Pociask, B. White (ISWS), and L. Keefer (ISWS).

*A draft report containing results of a cooperative study conducted by the ISGS, **Illinois Natural History Survey**, and **Illinois State Water Survey** has been delivered to the **U.S. Army Corps of Engineers**, which funded the study. The report outlines proposed stream assessment and restoration protocols for the Illinois River Basin. As part of the project, ISGS scientists compiled a working list of 194 data sets with source information to be assembled for use in baseline watershed assessments within the basin. The data sets vary widely in scale, temporal and spatial completeness, quality, and availability but will be normalized as much as possible for use in future studies. Working with the **Illinois Department of Natural Resources** watershed program planner, the intent is to offer as much of the geologic, biological, and infrastructure information as possible to the public in digital form.*

Incorporating Electronic Logs of Wells and Borings Obtained by the Quaternary Section into ISGS Database, C. Stohr, and A. Lecouris.

Klumpen: Meso-scale Features of Soils, L. Follmer and J. Dexter.

Mapping Geochemical Trends of Surficial Materials in Illinois, A. Dixon-Warren.

Phillips Park Mastodon Excavation, B. Curry, S. Greenberg, D. Voorhees (Waubonsee Community College), and Jim Oliver (Illinois State Museum).

Pre-Illinoian Sediments in Illinois, M. Killey and M. Barrett.

Quaternary Database Development, B. Stiff, M. Barrett, and A. Lecouris.

Reconstruction of Past Climate, Vegetation, and Lake Conditions at the Brewster Creek Site, DuPage County, Illinois, B. Curry.

Soils and Parent Materials of the Spring Bay 7.5-minute Quadrangle, P. Weibel, A. Stumpf, M. Barrett, and P. Carrillo.



Portion of Soils and Parent Materials of Spring Bay Quadrangle, Peoria and Woodford Counties.

*The soils and parent materials in the Spring Bay Quadrangle are carefully delineated on a new map for the Spring Bay Quadrangle. The information on this map will be useful to those trying to determine the engineering properties, flooding potential, and suitable land use within the area covered by the quadrangle. The information on the map is from original mapping and data provided by the **U.S. Department of Agriculture (USDA), Natural Conservation Service**, information from the USDA Soil Associations of Illinois, and information collected during ISGS surficial geologic mapping field work.*

*Because soils are classified and mapped in part based on the characteristics of their parent materials, the map portrays the thickness of a silty or loamy surface cover. Other factors in soil classification include the type of vegetation under which the soil series developed and the USDA drainage class.*

Stream Channel Dynamics Assessment, A. Phillips and B. Rhoads (UIUC).

Summary of Illinois River Basin Landforms and Topographic Regions, A. Phillips, L. Smith, J. Hannah, P. Anderson (ISU), and T. Kemmis.

Surficial Geology and Bedrock Topography of the Bethalto 7.5-minute Quadrangle, D. Grimley, M. Barrett, and D. Byers.

Surficial Geology and Bedrock Topography of the Elgin Quadrangle, B. Curry, M. Barrett, and J. Domier.

Surficial Geology and Bedrock Topography of the Hampshire Quadrangle, B. Curry, J. Aud, M. Barrett, and J. Domier.

Surficial Geology of the Collinsville 7.5-minute Quadrangle, A. Phillips, M. Barrett, and P. Carrillo.

Surficial Geology of the Crystal Lake 7.5-minute Quadrangle Map, B. Curry, M. Barrett, and J. Domier.

Surficial Geology of the Dunlap 7.5-minute Quadrangle, P. Weibel and M. Barrett.

Surficial Geology of the Edwardsville 7.5-minute Quadrangle, A. Phillips and M. Barrett.

Surficial Geology of the Granite City 7.5-minute Quadrangle, A. Phillips and M. Barrett.

Surficial Geology of the Grantfork 7.5-minute Quadrangle, D. Grimley, A. Phillips, J. Duncan, and J. Aud.

Surficial Geology of the Grayslake Quadrangle (STATEMAP), A. Stumpf, M. Barrett, M. Barnhardt, S. Wildman, and J. Domier.

Surficial Geology of the Highland 7.5-minute Quadrangle, D. Grimley, A. Phillips, J. Duncan, and J. Aud.

Surficial Geology of the Kellerville and Fishhook 7.5-minute Quadrangles, M. Barnhardt, M. Killey, and J. McLeod.

Surficial Geology of the Maple Park 7.5-minute Quadrangle, D. Grimley.

Surficial Geology of Marine 7.5-minute Quadrangle, A. Phillips and M. Barrett.

Surficial Geology of the New Douglas 7.5-minute Quadrangle, D. Grimley, A. Phillips, J. Duncan, and J. Aud.

Surficial Geology of the Oakhill 7.5-minute Quadrangle, P. Weibel and M. Barrett.

Surficial Geology of the Pingree Grove 7.5-minute Quadrangle, D. Grimley, M. Barrett, P. Carrillo, C. Nimz, and J. Steinfeldt.

Surficial Geology of Prairietown 7.5-minute Quadrangle, A. Phillips, and M. Barrett.

Surficial Geology of the Spring Bay 7.5-minute Quadrangle, P. Weibel, A. Stumpf, M. Barrett, and P. Carrillo.

Surficial Geology of the St. Jacob 7.5-minute Quadrangle, A. Phillips, and M. Barrett.

Surficial Geology of the Waterloo 7.5-minute Quadrangle, A. Phillips and M. Barrett.

Surficial Geology of the Wood River 7.5-minute Quadrangle, D. Grimley and M. Barrett.

Surficial Sand and Gravel Isopach Map of the Crystal Lake 7.5-minute Quadrangle, B. Curry, M. Barrett, and J. Domier.

Three-dimensional Geological Mapping for the Central Great Lakes Geologic Mapping Coalition, M. Barnhardt.

*ISGS and Lake County officials have a more complete picture of the county's geology and resources than ever before. Detailed information obtained through geologic mapping in the county can serve as a base on which to build good land use decisions. Field work and three-dimensional modeling have been completed for the Antioch 7.5-minute Quadrangle pilot study of the **Central Great Lakes Geologic Mapping Coalition**, funded by the **U.S. Geological Survey (USGS)**.*



*The final technical report, six geologic map products, and a three-dimensional digital geologic model of the quadrangle were delivered early in 2004 to the USGS.*

*During the pilot project, coalition members (ISGS; Indiana, Michigan, and Ohio geological surveys; and the USGS) worked together to develop and implement standard protocols for (1) database development and information transfer to the public; (2) fieldwork, including drilling, sample description, and data entry; (3) techniques for verifying data point locations and sources; (4) integration of information from geophysical and mapping techniques; and (5) three-dimensional modeling of the Quaternary deposits from land surface to bedrock.*

*Quaternary geologist, Michael Barnhardt, displays a map poster containing geologic maps and three-dimensional models that can be used for groundwater applications in northeastern Illinois.*

As part of the project, ISGS representatives delivered the digital geologic database for the Antioch Quadrangle mapping project to Lake County. In return, the county provided data for various coverages, such as the Lake County Forest Preserve boundaries and transportation routes. The ISGS also received the USGS high-resolution orthoimagery of the county that had been compiled for the Urban Areas Homeland Security Project and detailed land elevation data derived from a county-funded study. ISGS seismic profiles in the adjacent Wauconda and Fox Lake Quadrangles and observation wells in the Fox Lake Quadrangle provided data that helped the geologists interpret the geology and groundwater levels of the area.

Vincennes Mapping Project, M. Barnhardt, D. Luman, P. Weibel, J. McLeod, R. Bauer, W. Su, and M. Barrett.

Williamson County Quaternary Mapping, L. Follmer, J. Nelson, S. Indorante (USDA-NRCS), M. McCauley (USDA-NRCS), and M. Barrett.

## Geoscience Information Center

Classroom CD-ROM of the GeoActivities Binder, M. Dufour, C. Briedis, C. Nimz, R. Vaiden, and W. Frankie.

Geology of State Park Series, Illinois Beach State Park Volume, M. Dufour, S. Greenberg, M. Chrzastowski, J. Hines, R. Vaiden, C. Abert, J. Decker, C. Nimz, J. Steinfeldt, D. Byers, C. Briedis, and J. Dexter.

Geology of State Park Series, Starved Rock/Matthiessen Volume, M. Dufour, S. Greenberg, M. Chrzastowski, J. Hines, R. Vaiden, C. Abert, J. Decker, C. Nimz, J. Steinfeldt, D. Byers, C. Briedis, and J. Dexter.

Digitization of ISGS publications and maps, M. Dufour, M. Krick, and M. Knapp.

*ISGS staff from the Publishing, Library, and Information Technology sections are working together to ensure that publication and map files are institutionally archived. At completion, all current products are submitted to the institutional archives as high-quality PDF documents. Software-specific versions of these files are also archived within the Publishing, Design, and Photography Section archives. The section is also producing high-quality scans of high-priority bulletins, circulars, and environmental geology publications, some of which are valuable but out of print. The goal is to make these publications accessible to the public on the ISGS Web site.*

## Information Technology

ArcIMS Application to Access ISGS Well Data, S. Beaverson, C. Korose, S. Gustison, C. Nimz, R. Krumm, R. Rice, and B. Herzog.

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***“The new Rand McNally [Chicago area map] products were made with the help and cooperation of your agency and many others in the Chicago area. . . . As one of the researchers responsible for this product, I hope you (Dan Nelson) enjoy the new Rand McNally Chicago area map products. Thank you for your help.”***

***—Jan Olsen  
Data Specialist, Geographic Research Department  
Rand McNally  
Irvine, California***

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*The ISGS has long been an official repository for the paper records of over 700,000 wells drilled in Illinois. Now much of this water and related well data for private water wells, engineering borings, and stratigraphic borings is available online.*

*The data come from well drillers' logs, pump installation reports, and other records. This online availability greatly increases access to this large collection of records, some of which date as far back as the 1800s.*

Computer Applications Programming, LEGAL Replacement or Rewrite, D. Nelson

Digital Bedrock Surface Map, C. Abert and P. Weibel.

## Geoscience Education



*ISGS librarian Kristi Mercer (left) and geologist Myrna Killey meet the public at an Urbana book event. Two ISGS fossil posters serve as a backdrop to the exhibit and a conversation starter.*

2004–2005 Public Geological Science Field Trips, W. Frankie, R. Jacobson, M. Knapp, C. Nimz, and S. Cromwell.

*The fall 2003 public field trips, held in the Cairo vicinity, provided about 120 people, including 7 teachers, with the opportunity to learn about the unglaciated landscape, general geology, and mineral resources of the area.*

*Participants on the spring 2004 trips to the Pekin area toured the Illinois River valley, visiting outcrops of coal-bearing Pennsylvanian age strata and exposures of Pleistocene glacial deposits, including sand dunes, ancient river terraces, and sand and gravel pits.*



*Mississippi River at Fort Defiance State Park.*

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***"Our thanks to the Illinois State Geological Survey for the appearance of Wayne Frankie at our show this past weekend. ISGS education materials and Wayne's knowledge and people skills were great, great additions to our annual show."***

***—Dave Reese, President  
Rock River Valley Gem and Mineral Society  
Loves Park, Illinois  
(by e-mail)***

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The ISGS also co-lead a fall workshop, sponsored by the **Illinois Natural History Survey**, for 32 participants. Participants learned about the geology and biology of the region through visits to Ferne Clyffe State Park, Bell Smith Springs and Garden of the Gods Recreation Areas, and the Cache River valley.

### **Geospatial Analysis and Modeling**

GIS Database Development, D. Nelson, C. Abert, L. Smith, R. Krumm, and J. Domier.

History of the Geologic Map of Illinois, C. Abert, D. Adomaitis, D. Kolata, M. Leighton, and C. Nimz.

Web Site Redesign and Reorganization, S. Denhart, J. Steinfeldt, C. Nimz, C. Briedis, and J. Hines.

*Several ISGS staff throughout the Survey continued to work with the ISGS Web team to provide new section pages and scientific content for the ISGS site. These items are part of ongoing efforts to improve the appearance, navigational consistency, accessibility, and current content of the Web site. The new online availability of maps, well records, and technical publications are part of this cooperative project.*

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***"... I wanted to commend the state of the Illinois GIS Clearinghouse. The data [are] supremely well organized, and instructions for converting from the text formats used to post the data to an actual theme are simple and well laid out. ... Finally, you provide the relevant projection information in an easy to find location. Thank you for the effort that went into creating the GIS information, and the effort that went into putting together the above-mentioned Web site."***

***—Dave Holman  
(by e-mail)***

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### **Library and Public Information**

Online Publication Catalog, M. Krick.

*The software and database behind the online ISGS publication catalog has recently been improved. The change solved existing database problems. Since implementation of the new*

*ISGS librarians Mary Krick (standing) and Chiawen Liu work on the improved ISGS publication catalog that gives users more pathways to the information they need.*



catalog, users can both browse and search for ISGS publications, their availability, cost, and format. Some publications in the catalog are also available online as downloadable PDF files.

National Geologic Map Database Data Entry, M. Krick.

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*"On Friday, April 16, 2004, I contacted your office in regard to a USGS topographic map I had of a property we own in Wisconsin. I had questions about section lines, grid lines, etc. and wasn't having any success getting information until I contacted your office and spoke to LeAnn [Benner] and Donald Luman. I don't often write follow-up notes, but they were so pleasant, helpful, and knowledgeable that I had to! They are a great asset to your offices."*

—Ray Bush  
(by e-mail)

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## **Publishing, Design, and Photography**

Central Great Lakes Geologic Mapping Coalition CD Sampler and Information Kit, C. Briedis, C. Nimz, and J. Dexter.

*A beta version of an interactive, informational CD relating to the Central Great Lakes Geologic Mapping Coalition was delivered to the sponsor, U.S. Geological Survey, during spring 2004. The CD described the Coalition mapping rationale, progress, and modern methods. It also explored mapping-related issues such as land use, surface and groundwater issues, construction materials, safe siting, ecosystem change, and hazard mitigation. Finally, the value and potential uses of maps was discussed.*

Digital Slide Archive and Database, J. Hines, J. Dexter, M. Krick, and C. Nimz.

ISGS Year End Multimedia Presentation, J. Dexter.

Mapping Video, J. Dexter, C. Nimz, W. Shilts, R. Berg, and M. Dufour.

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*"Your [2003] annual report, Illinois Geology: Meeting the Challenge of Change, is another great communication tool, with a mix of photos and crisp text. It should make the 'important people' (taxpayers) happy. I especially enjoyed the photo of the old Natural Resources Building, taken June 19, 1940. . . . You, and your predecessors, inherited a marvelous Survey!"*

—Allen F. Agnew  
Corvallis, Oregon

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## **Transportation and Environment Center**

### **Environmental Site Assessments**

*As they carry out their other duties, staff of the Environmental Site Assessments Section are verifying and mapping the locations of leaking underground storage tanks across the state, with the goal of gradually building a statewide database. This information is being shared with the Illinois Environmental Protection Agency (IEPA) as it is acquired. After an examination of McLean County data, the IEPA plans to replace its Web database with the more accurate ISGS database.*

Historical Land-Use Map of Burnham Park, Chicago, Cook County, B. Trask, C. Briedis, C. Nimz, and J. Bachrach (Chicago Park District).

*Nestled between Grant Park and Jackson Park and in close proximity to the Chicago museum campus, Burnham Park has a rich geological and cultural history. The ISGS, in cooperation with the Chicago Park District, is preparing a map and brochure to inform the park's many visitors about how the region's past has influenced the present-day setting*

*Riprap along the shoreline at Burnham Park, Cook County.*



LA 450 Class Preparation and Presentations, P. Bannon-Nilles, B. Trask, G. Kientop, and D. Adomaitis.

Preliminary Environmental Site Assessment Program for the Illinois Department of Transportation (IDOT SW ESA FY02 ANT), A. Erdmann, D. Adomaitis, P. Bannon-Nilles, C. Beccue, L. Bray, R. Bryant, N. Caldwell, S. Chakravorty, M. Collier, E. Collins, C. Decker, C. Dolan, S. Ellis, J. Geiger, M. Hart, G. Kientop, A. Leininger, M. Miller, D. Schmidt, M. Spaeth, B. Trask, and M. Yacucci.

*The \$1.5 billion Chicago Regional Environmental and Transportation Efficiency (CREATE) project to streamline railroad traffic flow through the greater Chicago area includes construction of 50 new miles of railroad track, restoration of some abandoned track, construction of six passenger/freight rail flyovers, improvement of several existing viaducts, and construction of 25 new road/railroad grade separations. At the request of the **Illinois Department of Transportation (IDOT)**, the ISGS will handle the preliminary environmental screening for this major effort. ISGS scientists recently participated in a two-day field meeting, in which approximately 20 to 25% of the CREATE project sites were visited.*

*ISGS geologists from the Environmental Site Assessment Section examine a site near railroad tracks in the Chicago area.*





*Protecting Bluff Springs Fen is the goal of ISGS and Illinois State Water Survey hydrogeologists who are studying and monitoring the fen for environmental impacts.*

## Wetlands Geology

*The ISGS and Illinois State Water Survey have supplied information about the structure and nature of available data on the hydrogeology of Bluff Springs Fen to representatives of Natural Resource Technology. That company has been contracted by Bluff City Materials to construct a computer model of the fen. ISGS scientists also shared data from monitoring wells for use in the model. The model will be used to estimate the impacts of proposed mining and other land-use changes on the fen. Long-term monitoring of the hydrogeologic conditions in the fen is planned.*

Bluff Springs Fen Field Trip for 2005 AASG Meeting, J. Miner.

Investigating the Role of a 1,600-acre Floodplain Site in Trapping Suspended Sediment from the Illinois and La Moine Rivers, K. Carr, R. Cahill, and D. Phillips.

Providing Hydrogeologic Assistance to IDOT Regarding Wetlands and Other Issues, J. Miner, J. Miner, C. Fucciolo, S. Benton, K. Carr, K. Weaver, B. Robinson, G. Pociask, K. Hart, E. Plankell, G. Shoffner, R. Cahill, and D. Larson.

Providing Hydrogeologic Assistance to the Illinois Nature Preserves Commission and IDNR, J. Miner, R. Locke, K. Weaver, G. Pociask, B. Robinson, and K. Hart.



# Publications

## July 1, 2003, to June 30, 2004

### ISGS SERIES

#### Annual Report

Illinois Geology: Meeting the Challenge of Change. Illinois State Geological Survey Annual Report. 2003. 34 p.

#### Brochures

Discovering the Past, Revealing the Future. 2004. 2 p.

Drilling on Your Property with Your Cooperation.  
Chris Wilson. 2004. 2 p.

#### Calendar

2004 ISGS Calendar. 2003. 14 × 18 inches. 2 sides.

2005 ISGS Calendar. 2004. 14 × 18 inches. 2 sides.

*The beauty and geology of Illinois Beach State Park are featured on the front side of this calendar. The reverse side includes information about the ISGS mission, its vision, and the range of its programs.*

*"Many thanks for the beautiful 2004 calendar featuring a photo of Starved Rock State Park. I appreciate your thoughtfulness. If my staff or I can ever be of assistance, please let us know."*

—Sen. Peter G. Fitzgerald  
United States Senate  
Washington, D.C.



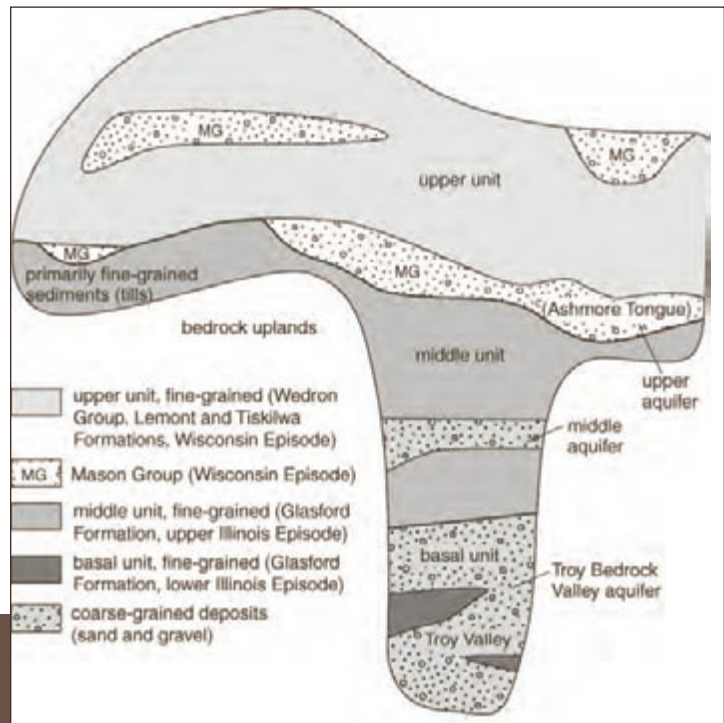
2005 calendar.

## Circulars

**Circular 562** Constructing a Three-dimensional Geologic Model of the Virttaankangas Aquifer, Southwestern Finland: Methods Applicable to Illinois. A. Artimo, R.C. Berg, C.C. Abert, and J. Mäkinen. 2003. 9 p.

**Circular 563** Groundwater Geology of DeKalb County, Illinois, with Emphasis on the Troy Bedrock Valley. R.C. Vaiden, E.C. Smith, and T.H. Larson. 2004. 40 p. (CD-ROM)

*A study of the geology and shallow groundwater resources of DeKalb County, concentrating on the aquifers of the buried Troy Bedrock Valley, showed that these aquifers have the potential for future groundwater development. The study describes the shallow bedrock formations and presents updated maps showing their thicknesses and extent. Cross sections depict the complexity of the materials overlying the bedrock and filling the Troy Bedrock Valley. Descriptions of the three informal units comprising the sediments in the buried bedrock valley will help the county understand and more effectively manage its water resources. The study was sponsored primarily by the IDNR Water Inventory and Aquifer Assessment Program.*



*Schematic diagram showing the glacial sediments and potential aquifer positions for the Troy Bedrock Valley area in DeKalb County.*

**Circular 564** Delineation of the Coalbed Methane Resources of Illinois. I. Demir, D.G. Morse, S.D. Elrick, and C.A. Chenoweth. 2004. 66 p. plus appendices. (CD-ROM)

*Coalbed methane is likely to meet a significant portion of the increasing U.S. demand for natural gas for the next several decades. Of the approximately 284 billion tons of coal in the Illinois Basin, 211.4 billion tons are in Illinois. This report discusses results of a research project sponsored by the Illinois Department of Commerce and Economic Oppor-*



**tunity.** The project study identified and sampled coal seams and shales for gas data.

Maps produced from project data delineate the thickness, depth, rank, elevation, and cleat directions of coals, tectonic structures, and mined-out areas in Illinois. This information can aid in determining the areas of the state's important coalbed methane reserves.

*Drill rig used to identify the location and extent of coal seams in southeastern Illinois.*

## Current Issues

Energy-Efficient Concrete from Fly Ash. S.-F.J. Chou. 2003. 4 p.



*Energy-efficient autoclaved aerated concrete blocks were used to build a school in Cahokia, a duplex in Waterloo, and this single-family house in Evansville, Indiana. (Photos provided by AAC of Mid America, East St. Louis, Illinois.)*

During the pilot-scale project described in this report, researchers from ISGS and **University of Illinois at Urbana-Champaign** manufactured autoclaved aerated concrete (AAC) blocks using by-product fly ash from Illinois coals. The project was supported by grants from the **Illinois Department of Commerce and Economic Opportunity** through the **Illinois Clean Coal Institute**. The researchers showed that AAC blocks are durable and lightweight, withstand all climates, have low maintenance, and allow for quick and easy construction. The blocks insulate three to six times better than do regular concrete blocks and are recyclable, nontoxic, and nonpolluting. Buildings constructed with the AAC blocks are very strong, airtight, and energy efficient.

Fired Bricks from Fly Ash. M.-I.M. Chou. 2003. 4 p.

## Geoscience Education Series

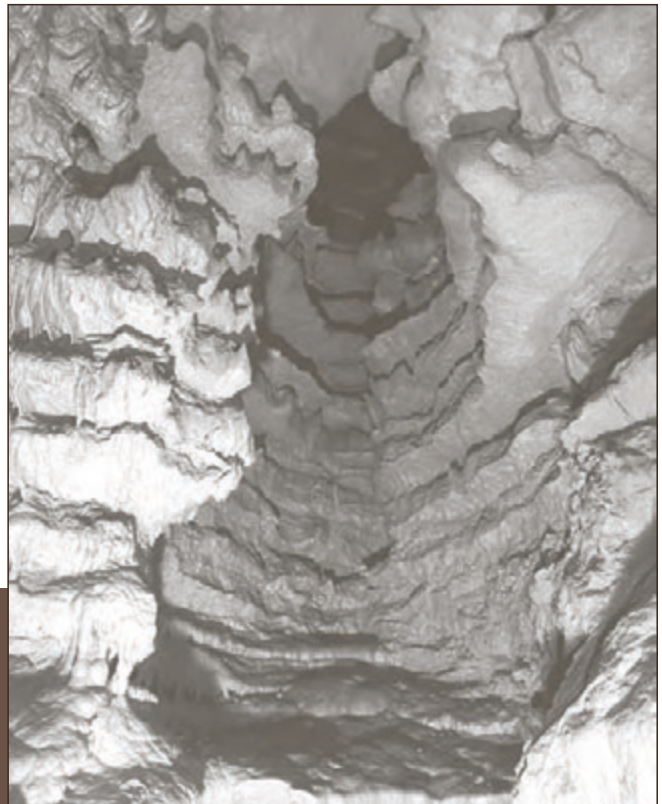
**GES 16** Guide to Rocks and Minerals of Illinois. W. Frankie. 2004. 69 p.

**GES 17** Illinois Groundwater: A Vital Geologic Resource. M.M. Killey and D.R. Larson. 2004. 61 p.

**GES 18** Land-Use Decisions and Geology: Getting Past “Out of Sight, Out of Mind.” M.M. Killey and R.C. Berg. 2004. 68 p.

**GES 19** Guide to the Illinois Caverns State Natural Area. S.V. Panno, S.E. Greenberg, C.P. Weibel, and P.K. Gillespie. 2004. 106 p.

*The Guide to the Illinois Caverns State Natural Area contains a feature-by-feature description of the caverns, profusely illustrated with color photographs. Useful both to armchair travelers and trip planners, the guide identifies and explains the types of cave structures visitors encounter. Other sections of the book describe the history of the region and the cave through geologic time, the human history of the cave, the regional geology and its effects on the formation and ongoing development of the cave, and the unique plants and animals of Illinois Caverns State Natural Area.*



*This well-formed chimney in the Lunch Room of Illinois Caverns displays spectacular fluting and solution features that emphasize limestone bedding planes.*

## Field Trip Guidebooks

**FTG 2003B** Guide to the Geology of the Cairo Area, Alexander, Pulaski and Union Counties, Illinois. W.T. Frankie and R.J. Jacobson. 2003. 82 p.

**FTG 2004A** Guide to the Geology of the Pekin Area, Tazewell and Mason Counties, Illinois. W.T. Frankie, R.J. Jacobson, and R.S. Nelson. 2004. 75 p.

## Illinois Coal Mines Quadrangle Maps and Directories

Coal Mines in Illinois—Oakwood Quadrangle. 1:24,000. Accompanying booklet, 36 p. 29 × 30.5 inches.

Coal Mines in Illinois—Danville Northwest Quadrangle. 1:24,000. Accompanying booklet, 72 p. 29 × 30.5 inches.

Coal Mines in Illinois—Johnson City Quadrangle. 1:24,000. 29 × 30.5 inches. Accompanying booklet, 144 p.

Coal Mines in Illinois—Crab Orchard Quadrangle. 1:24,000. 29 × 30.5 inches. Accompanying booklet, 116 p.

Coal Mines in Illinois—Harrisburg Quadrangle. 1:24,000. 29 × 30.5 inches. Accompanying booklet, 75 p.

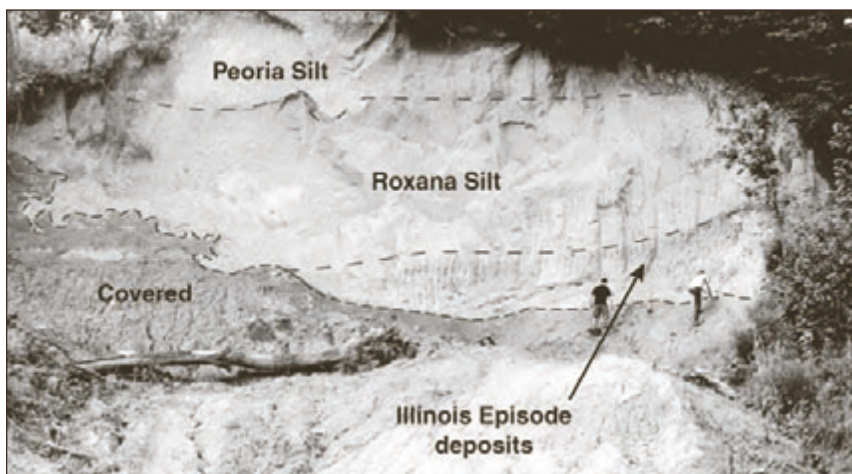
Coal Mines in Illinois—Marion Quadrangle. 1:24,000. 29 × 30.5 inches. Accompanying booklet, 40 p.

### Illinois Geologic Quadrangle Map Series

Grimley, D.A., and F.B. Denny. 2004. Bedrock Topography of French Village Quadrangle, St. Clair County, Illinois. IGQ French Village-BT. 34 × 28 inches, 1:24,000.

Grimley, D.A., and E.D. McKay. 2004. Surficial Geology of French Village Quadrangle, St. Clair County, Illinois. IGQ French Village-SG. 34 × 28 inches, 1:24,000. (two sheets).

*Quaternary geologists studied the near-surface deposits of the French Village Quadrangle in southwestern Illinois near the highly populated St. Louis Metro East area. The properties of these deposits were studied to determine areas that are susceptible to erosion or slumping, are suitable for mining, accelerate seismic shaking, or contain groundwater. The geologists also use the data to better understand and appreciate the landscape, archeological sites, and past climatic environments of the area.*



*This exposure in the French Village Quadrangle gives geologists a unique chance to study deposits from the last glaciation to reach southwestern Illinois, the Illinois Episode. At the location shown, these deposits have been preserved largely intact. The Powdermill Creek section reveals Sangamon Geosol (shown just over the geologists' heads) covered by the Roxana and Peoria Silts, thick deposits of wind-blown silt called loess.*

### Illinois Map Series

**Illinois Map 12** Illinois Land Cover. D.E. Luman, T. Tweddale, B. Bahnsen, and P. Willis. 2004. 1:500,000. 54 × 36 inches.

*The Illinois Land Cover map was produced in response to a need for current, detailed information about Illinois land, the raw material of Illinois. This land cover information for twenty-six identified categories is essential to ensure wise land-use decisions and good land stewardship. The data used to construct the map were acquired and interpreted from high-*

quality satellite imagery. More than 76% of Illinois land is devoted to agriculture, primarily corn and soybeans, followed by forested lands (11.5%), urban and built-up lands (6.5%), wetlands (3.9%), and surface water (1.7%). Several agencies participated in this land inventory, including *Illinois Natural History Survey, Illinois Department of Natural Resources Office of Realty and Environmental Planning, United States Department of Agriculture, Illinois Department of Agriculture, National Agricultural Statistics Service, and National Gap Analysis Program.*



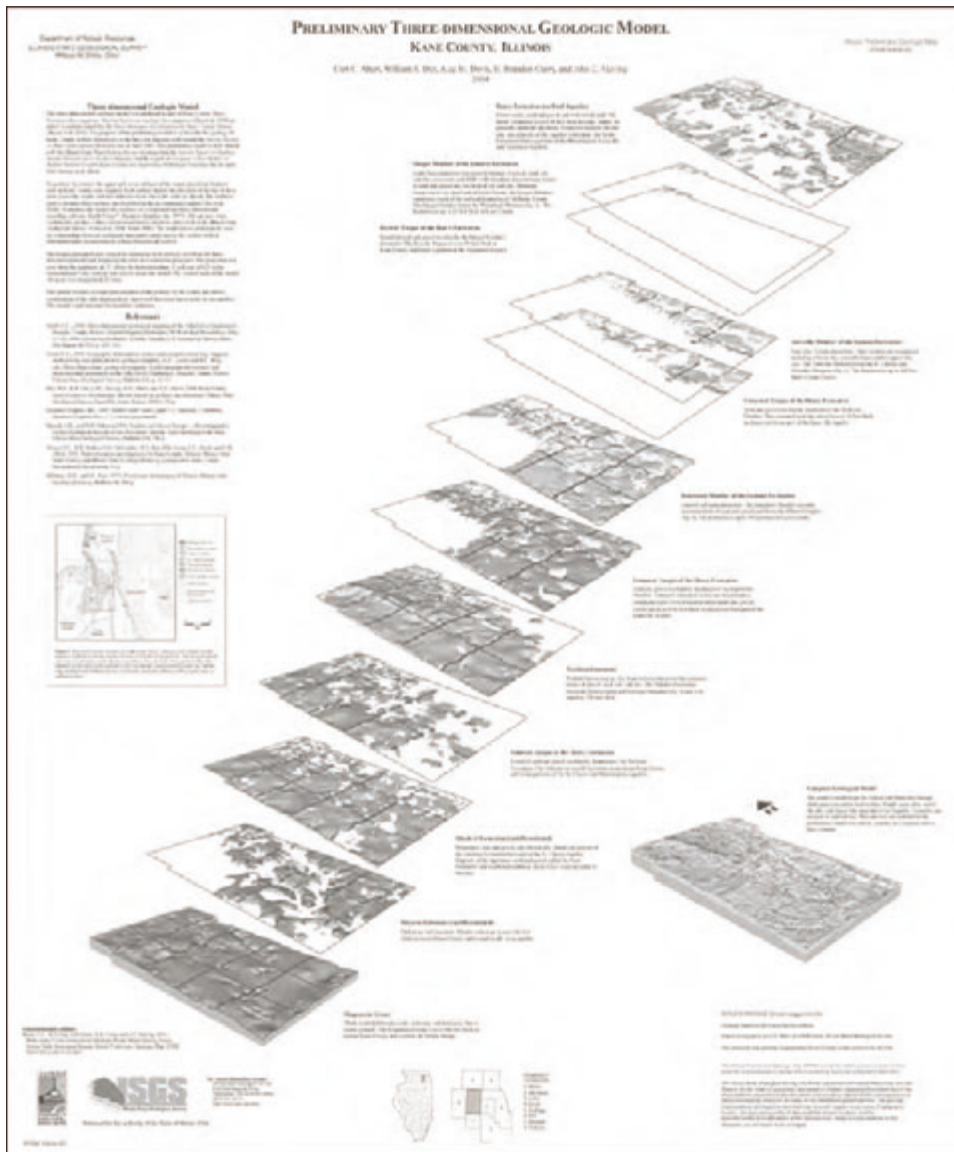
Illinois Land Cover map.

**Illinois Map 13** Coal Industry in Illinois. R.J. Jacobson and S.D. Elrick. 2004. 1:500,000. 54 × 36 inches.

### Illinois Preliminary Geologic Map Series

Abert, C.C., W.S. Dey, A.M. Davis, B.B. Curry, and J.C. Sieving. 2004. Preliminary three-dimensional geologic model, Kane County, Illinois: Illinois State Geological Survey, Illinois Preliminary Geological Map, IPGM Kane-3D, scale is variable. 26 × 32 inches.

*ISGS hydrogeologists have developed a conceptual model for Kane County geology based on published materials and their experience working in northeastern Illinois. The scientists interpreted information from a project database of over 27,000 water well and boring records to visualize surfaces of select geologic units. These surfaces were then used to create prelimi-*



This three-dimensional model of the geology of Kane County will help the growing county's efforts to manage its ground-water resources.

nary maps of Kane County bedrock geology, major Quaternary aquifers, aquifer sensitivity to contamination, and a three-dimensional geologic model and cross sections. These map products can be used to locate, develop, and better understand the water resources of this rapidly developing area.

Dey, W.S., A.M. Davis, B.B. Curry, and J.C. Sieving. 2004. Preliminary bedrock geology map, Kane County, Illinois: Illinois State Geological Survey, Illinois Preliminary Geologic Map, IPGM Kane-BG. 1:100,000. 26 × 32 inches.

Dey, W.S., A.M. Davis, J.C. Sieving, and B.B. Curry. 2004. Preliminary map of aquifer sensitivity to contamination, Kane County, Illinois: Illinois State Geological Survey, Illinois Preliminary Geologic Map, IPGM Kane-AS. 1:100,000. 26 × 32 inches.

Dey, W.S., A.M. Davis, B.B. Curry, and J.C. Sieving. 2004. Preliminary geologic cross sections, Kane County, Illinois: Illinois State Geological Survey, Illinois Preliminary Geologic Map, IPGM Kane-CS. 1:100,000. 26 × 32 inches (two sheets).

Dey, W.S., A.M. Davis, B.B. Curry, and J.C. Sieving. 2004. Preliminary map of major Quaternary aquifers, Kane County, Illinois: Illinois State Geological Survey, Illinois Preliminary Geologic Map, IPGM Kane-QA. 1:100,000. 26 × 32 inches.

Grimley, D.A., 2004, Bedrock topography of Maple Park Quadrangle, Kane and DeKalb Counties, Illinois: Illinois State Geological Survey, Illinois Preliminary Geologic Map, IGPM Maple Park-BT, 1:24,000. 34 × 28 inches.

Grimley, D.A., 2004, Surficial geology of Maple Park Quadrangle, Kane and DeKalb Counties, Illinois: Illinois State Geological Survey, Illinois Preliminary Geologic Map, IPGM Maple Park-SG, 1:24,000. 34 × 28 inches (two sheets).

### **Open File Series**

**OFS 2003-6a** Surficial Geology of Tazewell County, Illinois. P.D. Johnstone. 2003. 35 × 44 inches. 1:62,5000.

**OFS 2003-6b** Thickness of Quaternary Deposits of Tazewell County, Illinois. P.D. Johnstone. 2003. 35 × 38 inches. 1:62,5000.

**OFS 2003-6c** Surface Slopes of Tazewell County, Illinois. P.D. Johnstone. 2003. 35 × 38 inches. 1:62,5000.

**OFS 2003-6d** Aquifer Sensitivity Map of Tazewell County, Illinois. P.D. Johnstone. 2003. 34 × 48 inches. 1:62,5000.

**OFS 2003-6e** Resource Extraction and Landfill Activities of Tazewell County, Illinois. P.D. Johnstone. 2003. 34 × 38 inches. 1:62,5000.

**OFS 2003-6f** Shaded Relief Map of Tazewell County, Illinois. P.D. Johnstone and C.S. McGarry. 2003. 35 × 38 inches. 1:62,5000.

**OFS 2003-6g** Surface Topography of Tazewell County, Illinois. P.D. Johnstone and C.S. McGarry. 2003. 38 × 34 inches. 1:62,5000.

**OFS 2003-6h** Bedrock Topography of Tazewell County, Illinois. P.D. Johnstone. 2003. 38 × 34 inches. 1:62,5000.

**OFS 2003-6i** Location of Data Points of Tazewell County, Illinois. P.D. Johnstone. 2003. 34 × 38 inches. 1:62,5000.

**OFS 2003-7** Dick Howard's Mid-80s Payzone Maps (in PDF format). 58 maps. Original size, 30 × 30 inches. Original scale, approx. 1:32,000. (CD-ROM)

**OFS 2003-12 3-D** Visualization of Bedrock Resources in Lake County, Illinois. Map compilation and interpretation: H.E. Leetaru, M.L. Sargent, M.H. Riggs, and D.R. Kolata. 2003. 2 map sheets, originally 64 × 36 inches. (CD-ROM)

**OFS 2003-13** Reservoir Characterization and 3-D Models of Mt. Simon Gas Storage Fields in the Illinois Basin: Final Report. D.G. Morse and H.E. Leetaru. 2003. 96 p. (CD-ROM)

*Utilities in northern Illinois use the permeable and porous Cambrian Mt. Simon Sandstone for natural gas storage. In a study sponsored by the U.S. Department of Energy, ISGS geologists examined the Mt. Simon Sandstone in the Manlove Gas Storage Field, Champaign County, and the Herscher Gas Storage Field, Kankakee County. The geologists wanted to describe the three-dimensional geometries of these fields more accurately.*



**OFS 2004-7** Harrisburg Potential Wetland Compensation Site: Level II Hydrogeologic Characterization Report, Harrisburg, Saline County, Illinois (Federal Aid Project 332). G.E. Pociask. 2004. 29 p. (CD-ROM)

**OFS 2004-8** Three-dimensional Geologic Mapping for Groundwater Applications. Workshop Extended Abstracts. 49th Annual Meeting Geological Association of Canada, Mineralogical Association of Canada, St. Catharines, Ontario, Canada, May 15, 2004. 100 p. R.C. Berg, H. Russell, L.H. Thorleifson (eds.)

—*Commentary—Three-dimensional Geologic Modeling: Challenging Our Terminology and Understanding of Geologic Maps: R.C. Berg and D.A. Keefer. p. 4–9.*

—*Three-dimensional Geologic Mapping in Rapid-Growth Areas: A Case Study from Lake County, Northeastern Illinois: A.K. Hansel, B.J. Stiff, and M.L. Barnhardt. p. 23–27.*

—*Addressing Data Management Challenges in 3-D Geologic Mapping Projects: D.A. Keefer and A.M. Davis. p. 40–44.*

**OFS 2004-9** Kane County Water Resources Investigations: Interim Report on Geologic Investigations. W.S. Dey, B.B. Curry, J.C. Sieving, A.M. Davis, and C.C. Abert. 2004. 80 p.

## Poster

**Illinois Fossils:** D.R. Kolata and R.D. Norby. 2004. 24 × 30 inches, two sides.

*Side 1 of Illinois Fossils is covered with beautiful, high-resolution photographs of museum-quality fossil specimens—most of them from the ISGS collection. The key on side 2 provides additional, easy-to-understand information about those specimens. Also on side 2 are the answers to some commonly asked questions: What are fossils? Why are fossils so important? How old is that fossil? Where in Illinois are fossils from different periods found? Some of the most common fossil types found in Illinois are discussed.*

## Reprints

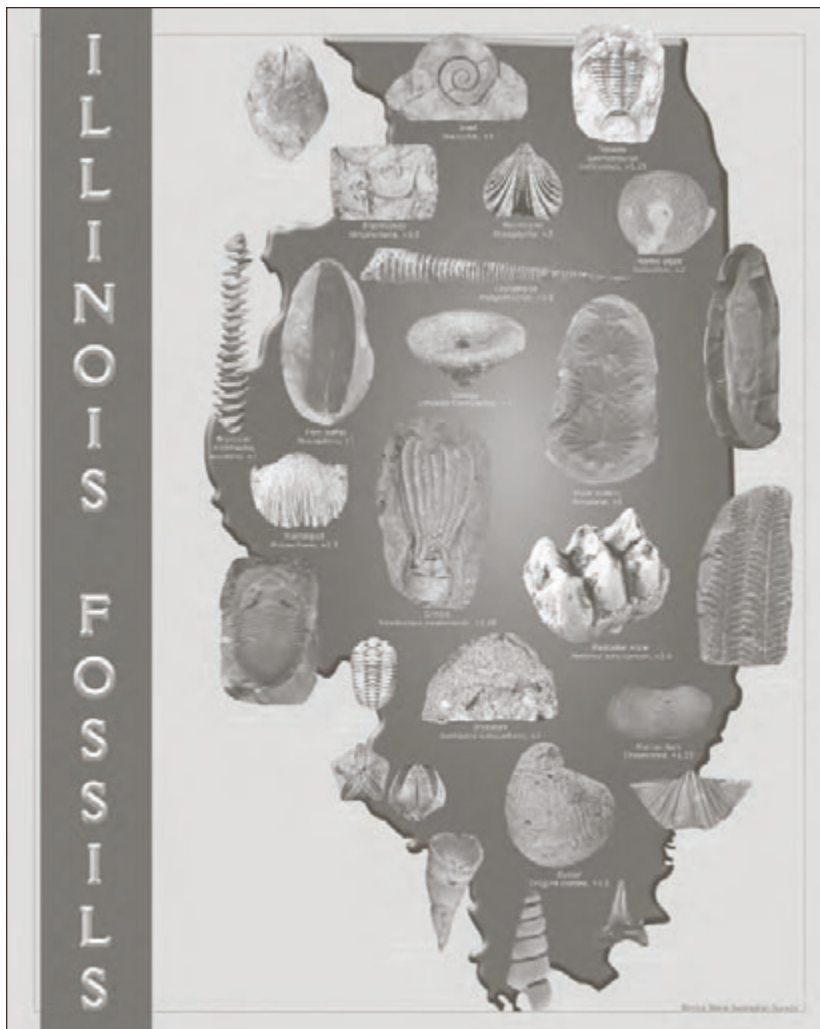
**Reprint 2003-B** Mercury in Illinois coals: Abundance, forms, and environmental effects: I. Demir. (Reprinted from Environmental Challenges and Greenhouse Gas Control for Fossil Utilization in the Twenty-first Century. M.M. Maroto-Valer, C. Song, and Y. Soong, Kluwer Academic/Plenum Publishers, New York. 2002.)

**Reprint 2003-C** 100 years of Pb deposition and transport in soils in Champaign, Illinois, U.S.A. Y. Zhang. (Reprinted from Water, Air, and Soil Pollution, v. 146, p. 197–210. 2003.)

**Reprint 2003-D** Ostracode-based reconstruction from 23,300 to about 20,250 cal yr BP of climate, and paleohydrology of a groundwater-fed pond near St. Louis, Missouri. B. Curry and D. Delorme. (Reprinted from Journal of Paleolimnology, v. 29, no. 2, February 2003, p. 199–207.)

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*Illinois Fossils  
poster, side 1.*

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