

Throughout its hundred-year history, the Illinois State Geological Survey has provided accurate, relevant and objective earth science information for the benefit of the state's citizens and institutions.



Revealing the Past, Discovering the Future

Story By Cheryl K. Nimz
Photos By Joel M. Dexter

Working from a field lab coal research station used from 1941 to 1945, geologists examined samples collected from rotary drill holes (above). Core samples from a recent coalbed methane drilling project near Olney were labeled and described by scientists.

During a century of change, some things remain the same. Understanding Illinois geology has always required getting dirty, sunburnt, cold or wet. Rocks, soils and every earth material in between need to be examined by

the geologist's trained eye, sometimes by climbing a rock exposure, striking a rock hammer against an outcrop or quarry wall, or following evidence along a stream bed.

Geologists must sometimes use large rigs to drill far beneath the surface, removing cores of earth materials for study, or even descend into sinkholes, caves and mines. Then it is back to the laboratory to examine the materials, record their properties and interpret them.

Over the years, other aspects of geologic study changed.

New, powerful technologies and

computer applications were needed to manage ever-increasing amounts of data, assist interpretations and share information. Also, the methods Illinois State Geological Survey (ISGS) geologists use, and the projects they work on, are refined and redirected to respond to a changing society and its shifting demands for resources, energy and environmental information. Political events—the

Great Depression, wars and oil embargos, to name a few—affected research directions.

Finally, collaboration with other individuals and agencies has become increasingly important. Many kinds of experts are needed to understand geological and societal issues, develop new products and technologies, and respond to requests for information.

100 years of Illinois State Geological Survey

1905–1930

Industrial Expansion

■ Topographic and geological mapping efforts—often conducted on foot or on horseback—identified major geologic units and provided the foundation for a basic understanding of the state’s geology. Mapping and research studies provided important technical information about coal, oil, fluorspar, brick clay, sand and gravel, limestone and sandstone—all important state industrial resources.

■ Glacial geologists began to classify glacial drift.

■ Hundreds of new types of fossils were described.

■ Work on groundwater was limited, but the need for supplies was already becoming critical for rapidly expanding areas, such as Chicago.



**Teachers’ field trip,
Quincy Area, 1930.**

**An X-ray study of
mineral matter distribution
in coal, 1940.**

1931–1955

The Economic Value of Geology

■ As international leaders in coal and glacial geology, ISGS geologists played an essential role in supporting the Illinois economy during the Depression, the war years and an oil boom. They inventoried and classified coal reserves, characterized clay minerals, and came to understand the connection between oil reserves and buried Silurian age reefs.

■ Information about the uses and specifications of limestone and dolomite provided reference standards for industry.

■ Groundwater research began in earnest as geophysical methods were found to be helpful in locating major water-bearing sand and gravel deposits (aquifers). Scientists also realized through mapping that large undiscovered groundwater supplies generally coincided with ancient preglacial valleys.

■ ISGS studies helped ensure sufficient Illinois fluorspar, lead and zinc for the war effort.

■ Work on blending Illinois coal saved transportation costs and added a new coal market.

■ Fossil discoveries refined the way geologists correlate, identify and date geologic units.

■ As structural features were identified and mapped, investigators came to understand the tectonic history of the Illinois Basin.

■ Engineering geology helped construction projects such as paved roads, dams and reservoirs, recreational lakes, Chicago subways and buildings, and underground gas storage.



**Seismic shot for
bedrock depth determination,
northern Will County, 1960.**

1956–1980

Addressing Society’s Issues

■ Geologists developed the first groundwater flow models, added seismic refraction and gravity surveys to their mapping, and improved the system for mapping buried bedrock valleys.

■ In response to demand for resources, scientists identified and mapped minable coal reserves and limestone for construction. They also studied the possibility of using limestone in coal scrubbers.

■ During the Korean and Vietnam wars, chemists developed fungicides to control fungus and mold on vinyl plastic and cotton fibers used by troops.

■ During the OPEC oil embargo, alternative fuels and additional, smaller oil fields were investigated.

■ Major stratigraphic descriptions and classifications were compiled, and terms were standardized.

■ ISGS geologists began to use the newly developed carbon-14 method of dating.

■ Knowledge of bedrock strata and Illinois’ structural and tectonic history continued to be refined.

■ Large engineering projects in Illinois included Chicago’s sanitary district tunnel (TARP) and gas storage in mined caverns, petroleum reservoirs, and saline aquifers.

■ Societal concerns about geological hazards were addressed through studies of known fault zones, landslides and shoreline erosion.

■ The now international concept of environmental geology was developed at ISGS and applied to problems such as groundwater contamination, disposal of solid and liquid wastes, leaking landfills, air pollution and urban planning.



Over the past 100 years, ISGS has amassed accomplishments that provide vital information for the citizens of Illinois.



Cheryl Nimz, staff writer, and Joel Dexter, scientific photographer, are based in the Champaign office of the Illinois State Geological Survey. Material for the article was adapted from a chapter by former ISGS Chief Morris W. Leighton in the centennial publication *Geology of Illinois*, now in progress.



1981–2005

Healthy Environment, Secure Economy

- The research thrusts of previous periods continued to evolve. Scientists searched for ways to improve the marketability of Illinois coal by managing carbon: make coal processing more efficient to reduce costs, develop sorbents to make coal combustion cleaner and capture waste by-products into useful new materials.
- Coalbed mapping studies are in progress to study the suitability of extracting methane and storing carbon dioxide to obtain energy and reduce air emissions.
- Locating high-quality construction aggregate resources near urban areas remain a critical concern.
- The detailed topographic mapping of the state has been completed, and detailed geologic mapping is under way. New geologic mapping techniques, multidisciplinary teams and computer visualization are able to provide highly detailed, three-dimensional geological information. This information has been found to be extremely useful in locating and protecting groundwater and aggregate resources, assessing contamination potential and siting facilities.
- Ongoing environmental investigations monitor wells and contamination sites, improve the understanding of how waste migrates, and research ways to contain contaminants and clean already contaminated areas.
- Additional studies are concerned with preparation for and mitigation of geological hazards, such as landslides, karst terrain, subsidence, shoreline erosion and earthquakes.
- Seismic data provide an improved picture of the subsurface.
- Scientists use paleontological information to study paleoclimate.
- The preservation, digitization and distribution of data holdings becomes a priority.

Modern map product for the Antioch Quadrangle in Lake County, showing three-dimensional, detailed geologic information.

2006 and beyond Looking Ahead

- Geologic investigations continue to be complex, requiring multi-disciplinary teams of experts from many public and private institutions.
- Increasing global energy demand will require more studies to manage carbon, locate oil and gas reservoirs, and research new energy sources and technologies.
- Information gained by three-dimensional, detailed mapping will become a required component of comprehensive land use planning and resource location and protection.
- Strategies for managing and pricing water resources will be needed.
- The ultra-deep geology of the state, not yet penetrated by drill bit, may become accessible to geologists through advanced processing of geophysical logs.
- New high-speed methods of data manipulation, visualization and communication will allow the public greater and faster access to these unique and valuable resources.



Gathering water samples for contaminant testing.

It was on May 12, 1905, that the Illinois General Assembly by legislative act re-established the state geological survey, which first existed from 1851 to 1875. By this act, the Illinois legislators formally recognized the importance of geological research to the state's economic development and environmental health.

Watch for announcements of special centennial publications and events during the anniversary period of May 2005 to May 2006. For current information, visit www.isgs.uiuc.edu or contact the Information Office, 615 E. Peabody Dr., Champaign, IL 61820 or phone (217) 244-2414.

