



▶ About NETL

▶ Key Issues & Mandates

▶ Research

▶ Technologies

Oil & Natural Gas Supply

▶ E&P Technologies

▶ Gas Hydrates

▶ T&D and Refining

▶ Contacts

Coal & Power Systems

Carbon Sequestration

Hydrogen & Clean Fuels

Technology Transfer

▶ Energy Analyses

▶ Solicitations & Business

▶ Education

▶ NewsRoom

▶ Contact NETL



Oil & Natural Gas Projects

Exploration and Production Technologies

Geographic Information System Approach for Play Portfolios to Improve Oil Production in the Illinois Basin

DE-FC26-02NT15132

Program

The project was selected under the Preferred Upstream Management Practices (PUMP) solicitation DE-PS26-01BC15304 (Round 2) issued in 2001. PUMP is aimed at pairing "best practices" and solutions coming from new technologies with an active campaign of disseminating information to domestic producers. PUMP goals are to slow the decline of domestic oil fields and to maintain the infrastructure to continue to produce oil as a vital part of National Security.

Project Goal

Opportunities for increased oil production have been overlooked in Illinois due to complex development histories, multiple stacked pays, heterogeneous reservoirs, and commingled production. The Illinois State Geological Survey (ISGS) has developed a new geographic information system (GIS)-referenced database that is delivered via the Internet. It is being used successfully to identify new fields and bypassed oil in underdeveloped areas.

Performer

Illinois State Geological Survey
Champaign, IL

Project Results

An interactive map website called ILoil was created and activated in February 2003. ILoil has enabled easy public access to well data information from over a century of drilling in Illinois. Response to the new ILoil website has been very positive, and, since January 2004, the number of daily visitors has more than tripled to over 6,200. Oil and gas operators, using only their web browsers, can easily manipulate very large databases by activating different combinations of layers, creating customized maps that can be used for development and exploration purposes.

Benefits

The following are anecdotes from ILoil website users exploring for oil.

Ron Perkins, vice-president of Residuum Energy in Durham, NC, attended a workshop. He states, "The ILoil site has been extremely useful. I don't know how I could continue to work in Illinois without it. It is relatively easy to survey an area of potential interest to determine the density of wells, the producing intervals in each field, and the current status of each well. The ability to screen for individual pay zones allows one to generate production distribution maps of specific horizons. The capability to overlay well data on topographic maps or aerial photographs is extremely valuable."

Alex Booth, a geologist with Continental Resources of Illinois in Mt. Vernon, IL, has used the ILoil site in

combination with GeoGraphix software to check the accuracy and completeness of his company's in-house well database. He commonly uses the site to generate maps showing the producing formations within a particular area to illustrate complex, multi-pay production characteristics of a prospect and to enhance prospect reports. The site has saved his company time and money by making data available quickly and easily via the Internet.

Bruce Schonert, a geologist in Olney, IL, attributes a new oil discovery to using the ILoil website. Historically, the Mississippian-age Aux Vases sandstone reservoirs exhibit a complex depositional pattern, and a somewhat hit-and-miss approach has been used to find reserves. Schonert has used the ILoil site to delineate intricate stratigraphic trends that successfully identified new prospective areas.

Background

Major constraints to production in the Illinois Basin are data management, accessibility of data, identification of reservoir compartments, and implementation of efficient and effective reservoir management strategies keyed to specific types of reservoir compartments.

Computerization, particularly of waterflood, well status, and producing formation data, can assist in identifying underdeveloped areas with the most potential for bypassed petroleum. Color-coded pay maps can readily illustrate producing trends and highlight areas with additional potential for development, as well as regions with exploration potential.

Project Summary

Highlights of the project include:

- Development of an ArcIMS website to deliver well data pertinent to exploration and development of oil reservoirs in Illinois.
- Pay zones layers compiled and made available.
- Contoured structure maps on the Barlow limestone, Ste. Genevieve Limestone, and New Albany Shale incorporating over 100,000 formation depths calculated for this project were compiled and made available as website layers.
- Over 168,000 core analyses were compiled, edited, and made available on the website.
- Waterflood unit boundaries and production and injection data were compiled for over 1,600 waterflood areas and made available on the ILoil website.
- Digital Orthophotographic Quadrangles are available as base maps on the ArcIMS website.
- US Geological Survey topographic maps are available as base maps on the website.
- There are over 2,700 daily users of the ILoil ArcIMS website.
- Technology transfer training in use of the website has occurred at 6 workshops and meetings.

ISGS has developed a methodology that is being used by industry to identify underdeveloped areas in and around petroleum reservoirs in Illinois using a GIS approach. ESRI software has been used to extract and compile data from the ISGS Oracle database and to present it in interactive map layers on a new website at http://meltwater.isgs.uiuc.edu/website/iloil_arc/mapviewer.htm.

The interactive maps are available to anyone with a web browser. Map layers can be manipulated to produce customized maps that meet individual user needs. Interactive maps and map layers have enhanced development and exploration capabilities in Illinois. These tools have revolutionized display and access of petroleum-related data in Illinois. This technology/methodology addresses the long-standing constraints related to information access and data management in Illinois by significantly simplifying the laborious process that industry previously used to identify exploration and development opportunities in Illinois.

The combination of ArcGIS-generated maps, upgrade of the ISGS Oracle database, and implementation of ArcSDE 4.0 and ArcIMS has vastly improved the institutional capability at ISGS to create interactive map layers

and provide map and data layers over the Internet.

Response to the website has been very positive. Training for over 1,000 potential users has taken place at workshops, presentations, and demonstrations at industry meetings. User feedback shows that users find the website to be effective and beneficial to their work in petroleum exploration and development in Illinois. The project performer is paying close attention to user suggestions for upgrades to the website.

The ISGS uses WebTrends software to monitor and tabulate use of all aspects of the ISGS web page. Since the ILOIL application was launched, many people have accessed the online mapping service. These statistics provide an indication of how the ILOIL application is being used. Statistics for May 2005 indicated that the ILOIL application received 193,984 hits, or about 6,200 per day. The ILOIL application was used by 622 unique visitors, including 350 people who used the site more than once. Perhaps most revealing is that the average visit is about 21 minutes, indicating that users are finding the site and very likely using it to access and download information. All reports from the field indicate that the oil and gas community is very satisfied with the ILOIL application. ISGS has received anecdotes of individuals developing and successfully drilling prospects using information from the ILoil website.

Current Status (August 2005)

The Illinois Petroleum Resources Board, which is funded by a voluntary checkoff of production-based contributions, was approached for funding to scan paper petroleum well records based on the popularity of the ILoil website. The board consists of Illinois petroleum industry representatives. ISGS requested a modest amount of funding for start-up expenses. The board agreed to fund the project at three times the initial request because they were impressed with the ILoil project results and supported the proposal to add scanned images of geophysical logs and well documents to the site. This new funding will allow ISGS to start archiving paper well records from over 180,000 wells.

The ILoil website is being updated and maintained through Petroleum Technology Transfer Council funding. Well data on the website is updated as it is entered into the ISGS Enterprise basic well database by state-funded staff. New layers and upgrades of existing layers are planned for the near future.

Publications

Gustison, S., Grube J., and Seyler, B., Internet Access to Well Information, World Oil, 2005, V. 226, No. 2, pp. 94-95.

Cokinos, J.S., Huff, B.G., Frailey, S.M., Seyler, B., and Grube, J.P., Reservoir Management Using the Illinois State Waterflood Database, SPE 91440, SPE Proceedings Volume of the Eastern Papers presented at the Eastern Section Meeting of the Society of Petroleum Engineers, 2004, pp. 1-7.

Johanek, Phil, Cokinos, James, Grube, J., Seyler, B., and Huff, B., GIS Approach to Improve Oil Recovery in the Illinois Basin, poster presentation (poster displaying PUMP II, Iloil website, and map images and concepts), annual ESRI convention in San Diego, CA, August 8-13, 2004.

Seyler, B., Geographic Information System Approach for Play Portfolios to Improve Oil Production in the Illinois Basin, final contract report submitted to DOE, December 2004.

Seyler, B., Gustison S., Huff B.G., Korose C., Crockett, J. E., Johanek, P., and Grube, J.P., An Interactive ArcIMS Based Approach to Access, Display, and Manipulate Geologic Data and Maps, program with abstracts, American Association of Petroleum Geologists 33rd Annual Eastern Section Meeting, 2004, pp. 122-124.

Project Start: February 28, 2002

Project End: September 30, 2004

Anticipated DOE Contribution: \$425,602

Performer Contribution: \$431,377 (51% of total)

Contact Information

NETL - Chandra Nautiyal (chandra.nautiyal@netl.doe.gov or 918-699-2021)

ISGS - Beverly Seyler (seyler@uiuc.edu or 217-244-2389)

USA.GOV | U.S. DEPARTMENT OF ENERGY | DOE OFFICE OF FOSSIL ENERGY
DOE OFFICE OF ENERGY EFFICIENCY & RENEWABLE ENERGY | OFFICE OF ELECTRICITY DELIVERY & ENERGY RELIABILITY

[Disclaimer](#) | [Privacy Policy](#) | [Web Policies](#) | [FOIA/Privacy Act](#) | [Employees Only](#)