

## THE DIGITAL REVOLUTION: ARCHIVE, ORGANIZE, DELIVER

### BOTTOM LINE

One of the biggest needs of industry is quicker, more convenient access to a wider variety of data, preferably without leaving their offices. The state geological surveys in the Appalachian basin have made great strides in creating various types of databases, going well beyond the traditional individual well-based digital databases that began to be developed in the 1960s. The newer databases, many resulting from cooperative efforts involving multiple state surveys, include field scale data, as well as scanned images of a variety of data. The surveys also are placing a high priority on converting maps and cross sections from older research reports to a GIS that can be accessed by industry users.

### PROBLEM ADDRESSED

Traditionally, public oil and gas databases in the Appalachian basin have contained various parameters associated with site-specific well locations, including tops, formation thicknesses, treated intervals, initial well tests and pressure, and production histories. Each state agency, typically the geological survey, determined the data elements to be stored, created their own format, selected their own operating system, and developed different systems for delivering data to the user, if data were to be provided at all.

More recently, the state geological surveys participated in cooperative projects to develop basin-wide databases that included information on individual wells and fields. Individual reservoir data were compiled on a field scale for oil (TORIS database for Appalachian basin fields) and gas fields (Atlas of Major Appalachian Gas Plays), and a variety of other data types (stratigraphy, structure, seismic, petrology, geochemistry, production history) were compiled in a database and website for the Trenton-Black River play book project.

These basinwide databases created during recent research projects include digital maps, cross sections and other illustrations that were either works in progress or finished versions in reports and slides used for presentations. References from the literature and lab data generated during the projects also are included in this “new generation-style” database, one that captures in digital form all aspects of previous work as well as new information. This type of database is part of a new trend to capture, organize and deliver, through on-line delivery systems, new and old data and research information that can be sorted in a variety of ways.

Workshop speakers from each of the main producing states in the Appalachian basin discussed several of these new database projects, with an intended emphasis on how Industry can access the final products. The workshop was designed for geologists and engineers with an interest in, or who are actively working in, the Appalachian basin.

## TECHNOLOGY OVERVIEW

Authors used a combination of power point and on-line live demonstrations of their databases. Speakers from the Pennsylvania Geologic Survey (PGS) alternated, with John Harper presenting an overview of the WIS (Well Information System) and PA\*IRIS (Pennsylvania Internet Record Imaging System) and Kyle Imbrogno presenting a live demo of both. WIS originally was for internal use only, but eventually evolved into a system that can be used by visitors to the PGS offices, where survey personnel help the user log on to find information on individual wells.

PA\*IRIS was developed to allow industry to access well records from their offices. Essentially, the PGS scanned everything in their files and put it into this system. An expensive software system is required to view the information, so the PGS charges each subscriber a one-time \$5000 fee plus \$500 for annual maintenance.

Originally PA\*IRIS included scanned location plats, the completion record (drillers' log) and perhaps a plugging affidavit, but has evolved since '99 to link to WIS, so more detailed information on an individual well can be accessed. This includes interpreted information, such as log tops picked by staff geologists, plus lists of available logs, lists of "canned" reports with data in spreadsheets, and a production module that allows the user to gather production data. ArcReader allows users to view tiff images of oil and gas base maps.

The PGS is planning several new products that will become part of PA\*IRIS. These include 7.5 minute topographic maps with well locations, the ability to view several layers, download capability, interactive tools, etc. They plan 10-15 interactive layers that can be turned on or off, with print capability.

Joe Wells made the Ohio Geological Survey (OGS) presentation, using slides and a live demo to introduce POGO, the Production of Oil & Gas in Ohio database that is updated annually; the digital map series; bedrock geology, on CD or online; and the interactive map series. He spent most of his time on the interactive map series, which includes the oil and gas maps in combination with topographic maps, aerial photos, roads and streams. A print layout feature with scaling options allows you to create a PDF.

Searches can be made on many parameters, but most begin with the state permit number. Ohio has one file, one folder per well, in their system, whereas Pennsylvania has separate files for the plats, well record, plugging record, etc. The Ohio system allows a user to cut and paste well data and create their own shape files. They also have a query string option, allowing a user multiple choices to add to the query string before the search is executed and the data are assembled in a table or on a map.

Rich Nyahay presented New York's ESOGIS, or Empire State Oil & Gas Information System, beginning with a recap of the history of oil and gas database development in New York. Early punch card and tape systems eventually evolved into the on-line system of today. Their goal in New York was to make all subsurface data and

information, including all of their reservoir studies, available on the internet. This includes power point slides of numerous talks that presented the results of their research.

To use the site, one must first create an account before you can log in. Creating an account allows you to create different project files for yourself and then to add data to these files using a feature called "my well projects." There is no limit to the number of wells that you can download, but there is a one minute time limit on each download. A project manager feature allows you to create a project, add wells, tailor the data, display the data and download data to the project or export it to Petra.

Nyahay demonstrated the capability of the system, and went through many examples of how to search for data and the type of data that were displayed on well screens. Scanned images of well records, logs and other types of basic information are available, as are production data. A virtual core library allows the user to examine excellent quality core photos or scanned core images.

Subscriptions range from \$2500 to \$25,000, depending on which of five levels you choose.

Mary Behling presented a two-part talk, with part 1 being a description of the West Virginia Geological Survey's (WVGS) oil and gas database, and part 2 a description of a current project to assemble widely disseminated data on five tight gas plays from a variety of sources and deliver the data via an online system.

Current on-line services include "pipeline," a subscription service that allows users to access data on individual wells; production summaries, where queries can be made by well, by county or by years; e-logs, as scanned images in tiff files; focused datasets, mainly from project work, like Trenton-Black River, coal bed methane, etc); and the PTTC's IMS site, which is hosted by the WVGS.

She then described other services, including new services under development, and pointed out that the survey no longer will conduct customized requests, except to produce well spot maps. This means the survey no longer will produce maps of formation structure, thickness, production, etc as in the past.

The second half of her talk was on what the survey refers to as their "Log Scan" project. Essentially, the goal is to find every piece of data on five tight gas plays in two states, organize the data into a database, and delivery it to users on line. By doing so, trips to the surveys by industry can be reduced or eliminated, and they actually will be able to see more data on line than they would during a survey visit. The reason for this is that many of these data are widely scattered in offices of different people, as well as in file and map drawers, or in the core and sample library.

Brandon Nuttall was the boldest of all speakers, choosing not to use a single slide, but to demonstrate the Kentucky Geological Survey's (KGS) database for his entire talk.

However, he did provide a tutorial for the workshop notebook on how to access and roam through the system in search of data.

He began by pointing out that we already had observed how the surveys differed in the way they approached things, but they did not differ in one important respect: their mission, which is to serve the public. To this end, the KGS has taken a bold step to close their oil and gas record room (open by appointment only) and replace it with a system that can display everything in that room right on your computer screen in your office.

To do this, the user needs to download and install a free web browser plug in. No fees are required, no subscription service is necessary.

Nuttall urged attendees not to forget Google when prospecting for data on the internet. Google can lead you to the KGS database, where you can then conduct a criteria-based search or search through the geologic map service. Because it is all on the web, when you find something of value, you can bookmark and return to it. Popups must be enabled to view the data.

Many choices are available for data searches, and you can create a database for each search. Wells can be displayed on various maps, including topographic maps and aerial photos.

## CONNECTIONS

Based on a workshop sponsored by PTTC's Appalachian Region in Morgantown, WV on June 5, 2007

Speakers:

*Pennsylvania Digital Oil and Gas Products and Available Digital Geological Data* - John Harper and Kyle Imbrogno, Pennsylvania Geologic Survey

*Introduction to Ohio's New On-Line, Oil-and-Gas-Well Maps and Information* - Joe Wells and Donovan Powers, Ohio Geological Survey

*Updates on New York's ESOGIS (Empire State Oil & Gas Information System)* - Richard Nyahay and Taury Smith, New York State Museum Instituye

*The "Log Scan" Model: A New Approach for Delivering West Virginia's Data* - Mary Behling, West Virginia Geological Survey

*The New Prospectors: Digital Data Resources at the Kentucky Geological Survey* - Brandon Nuttall, Kentucky Geological Survey