

## PTTC Focused Technology Workshop

### “Rocks to Models: An Introduction to 3-D Reservoir Characterization and Modeling”

September 21, 2005; Morgantown, WV

#### Workshop Summary

Geologists, geophysicists and engineers all need a better understanding of how to characterize reservoirs and how to visualize and modeling them in three dimensions. This course was developed to provide an overview of 3-D reservoir characterization and modeling concepts and methods. The instructors addressed different types of petroleum reservoirs (carbonates, sandstones, natural fractures) and techniques to define and estimate reservoir architecture and properties within a sequence-stratigraphic and structural framework.

The course began with an overview of the objectives of reservoir characterization, analysis of porosity and permeability, and methods used to identify reservoir flow units. Stratigraphically- and structurally-compartmentalized reservoirs were reviewed, and the role and significance of outcrop analogs for reservoir characterization and modeling using case studies was emphasized.

The instructors presented common methods for constructing 3-D geologic models of reservoirs. This portion of the course included an overview of 3-D geologic modeling techniques, common cell-based methods, object-based methods, and the use of 3-D seismic data for conditioning reservoir models.

Most of the examples in the notebook and described from the course slides were from western areas. However, the instructors were quick to point out Appalachian reservoirs that were analogous to these examples, citing the Atlas of Major Appalachian Gas Plays as the source for this comparison.

The instructors provided an excellent set of color slides to be copied for the notebook, which was well organized with color tabs to match the course outline. In addition, they provided each participant with a website address where these slides can be viewed and downloaded for personal use.

The workshop began with individual introductions of the two instructors and 30 participants, so that the instructors would have a better understanding of who the individuals were, their interests, the type of work they do and the types of reservoirs that they work. Then the instructors began the course instruction, explaining each slide in detail, assuming no prior knowledge of anyone in the workshop, even explaining at length what each equation and graph could tell us about a reservoir.

The majority (60%) of the participants at this workshop were from industry. It was interesting that among the other 40% were four students who are training for

careers in the oil and gas industry, as well as four university professors and eight members of state and federal geological surveys. More than 70% of the industry registrants had attended a previous PTTC workshop in our region.

Based on the audience participation, personal feedback during the workshop and comments received on the evaluation forms (below), we would conclude that the workshop was very well received.

## Evaluation Forms

Twenty six of the 30 registrants submitted an evaluation form, and most of the attendees traded the form for a certificate of professional development hours upon their departure. Of those that were received, 14 were from industry (78% response), whereas 100% of the government employees, faculty members and students submitted their evaluation forms.

Ten of the 14 industry attendees who submitted a form had attended other PTTC workshops. Six of the 10 stated that they had used new technologies based on knowledge gained through PTTC workshops; all six stated that they were willing to share this or other information. All eight faculty members and geological survey staff members and one of the four students also had attended previous PTTC workshops, indicating that we are beginning to reach the future oil and gas professionals and those who teach and mentor them.

Seven of the 14 industry members who responded suggested topics for future workshops. These included advanced geophysical techniques, fractured reservoirs, economics and project viability, property evaluation, new exploration techniques, seismic interpretation and different use of programs for 3-D analysis. One suggested logging analysis. He must have missed the pre-meeting, two-day logging analysis workshop co-hosted by AAPG and PTTC.

Very few additional comments were received. Several noted that the workshop was good, or excellent, and that it was well organized and interesting, with knowledgeable speakers and excellent slides. Two others, however, pointed out that the slides that were shown were not always in the same order as the slides in the notebook. One of these (not from a university) went on to instruct us to “get instructors from (the) Eastern Section with eastern section examples. We have some fine universities with profs who do good work. Workshops in areas that I will not work in or using methods/programs that are way out of my price range are not useful to operators. Remember this is AAPG not GSA (which is more academic in my opinion).” He concluded with “This is not meant in offense to the good, knowledgeable and interesting speakers we have today.”

The two instructors were from the Colorado School of Mines and the University of Colorado.

## Attendance List

The list of final attendees is attached. Of the 33 that pre-registered, 31 actually attended (including the RLO Director who was not counted in the official attendance figure). All 31 had registered for and attended the Eastern Section meeting of the American Association of Petroleum Geologists that immediately preceded this workshop. That meeting attracted 319 registrants, so our workshop was important enough that 10% of those who attend the AAPG meeting were willing to stay over for a fourth day to attend it. In fact, several attendees had attended the two-day logging analyses workshop prior to the ES-AAPG meeting, so they were staying for a sixth day to attend this workshop.