

## PTTC Focused Technology Workshop

### “Well Testing: Theory and Practice”

August 16, 2005; Morgantown, WV

#### Workshop Summary

During the January 2005 meeting of the Appalachian Region's Producer Advisory Group (PAG) one of the PAG members suggested that the Regional Lead Organization should develop and host a full-day workshop on well test analyses. The objective of such a workshop would be to tie production issues back to the original well test. Options for data collection from low-volume producing wells also should be addressed, with a goal for increasing production but still making a profit after the additional cost of the data collection tests.

This workshop was designed to meet the recommendation of the PAG to fulfill the need they envisioned for such a workshop in this region. Dr. Kashy Aminian, professor of Petroleum and Natural Gas Engineering at West Virginia University, organized the workshop around three main themes: introduction and theory of well testing; well test data interpretation; and actual gas well testing. Examples of actual tests were discussed at the end of the workshop.

The introductory material included discussions of what is a well test, what can be learned from a well test, and how well test data are analyzed. Well test models also were discussed, along with homogeneous reservoir behavior, boundary effects and dual porosity reservoir behavior.

The second part of the morning session was devoted to well test data interpretation. Sub-topics included well test interpretation models; use of pressure derivative; diagnostic graphs; behavior specific plots; estimation of parameters; type curves; and verification.

Once well test theory had been covered in the morning, the afternoon session could be devoted to well testing in practice. The opening discussion focused on gas well testing, with these sub-topics: adjusted pressure and time; deliverability testing; empirical solutions; and theoretical solutions. This discussion was followed by the presentation of actual examples from Appalachian basin well test, and an open discussion period.

The workshop material emphasized three main points that were made at the beginning of the workshop: well testing is the science of measuring pressure changes in a well, and interpreting those pressure changes; analysis of test data provides estimates of flow properties and reservoir geometry; and properly collected data in the field can simplify the analyses and improve the accuracy of reservoir property estimates.

Participants at this workshop were predominantly from industry (91%) who came from five contiguous Appalachian basin states (West Virginia, Pennsylvania, Ohio, New York, Virginia), with one from the Michigan basin. More than 70% of the 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 fairly well received. Quite a few of the participants felt that the material was heavy on theory and light on the practical side, and examples were not included in the notebook material to take away from the workshop.

### Evaluation Forms

Twenty of the 23 registrants submitted an evaluation form, perhaps because most of the attendees were anxious to trade the form for a certificate of professional development hours. Of those that were received, 18 were from industry. Fifteen of the 20 had attended other PTTC workshops. Four of these stated that they had used new technologies based on knowledge gained through PTTC workshops; several indicated that they were willing to share this or other information.

Five people suggested topics for future workshops: deep well drilling techniques; gas storage; exploration and development techniques and trends; fracing and recompletions; and production related. Additional comments received were not entirely positive. Among the negative, the consensus was that the program was too dry and technical, and that although examples were presented, the examples were not included in the notebook or on a CD that they could take with them. One of the longer comments was this: "This course was too theoretical in nature. While addressing in great detail what analytical techniques were utilized in well testing, (the) course lacked in practicality. Could have been jointly taught with Eastern Reservoir Services, a company that specializes in well testing, etc ."

### Attendance List

The list of final attendees is attached. Of the 23 that pre-registered, 21 actually attended, and two walk-ins brought the final attendance to the 23 that were expected.