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Petroleum Technology Transfer Council

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Productivity in the Domestic E&P Arena

Equipment, steel and drilling rig scarcities aside, operators must get the most from their human resources to seize the domestic E&P challenges in front of them today. Factors that contribute to high productivity include knowledgeable, insightful workers using efficient tools to solve technical problems and realize opportunities that continually present themselves. There is little time or money to relearn past lessons gained from either within the company or from the E&P industry at large. This requires both individual and company commitments to stay current and work smart.

PTTC's activities can be a major contributor to productivity. Bottom-line oriented workshops deliver regionally-

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PTTC is a national not-for-profit information network formed in 1994 by oil and natural gas producers. Programs are funded by matching funds from the US Department of Energy (DOE) with funds from State Governments, Universities, State Geological Surveys and Industry. This program would not be possible without contributions from the DOE Office of Fossil Energy through the National Energy Technology Laboratory (NETL).

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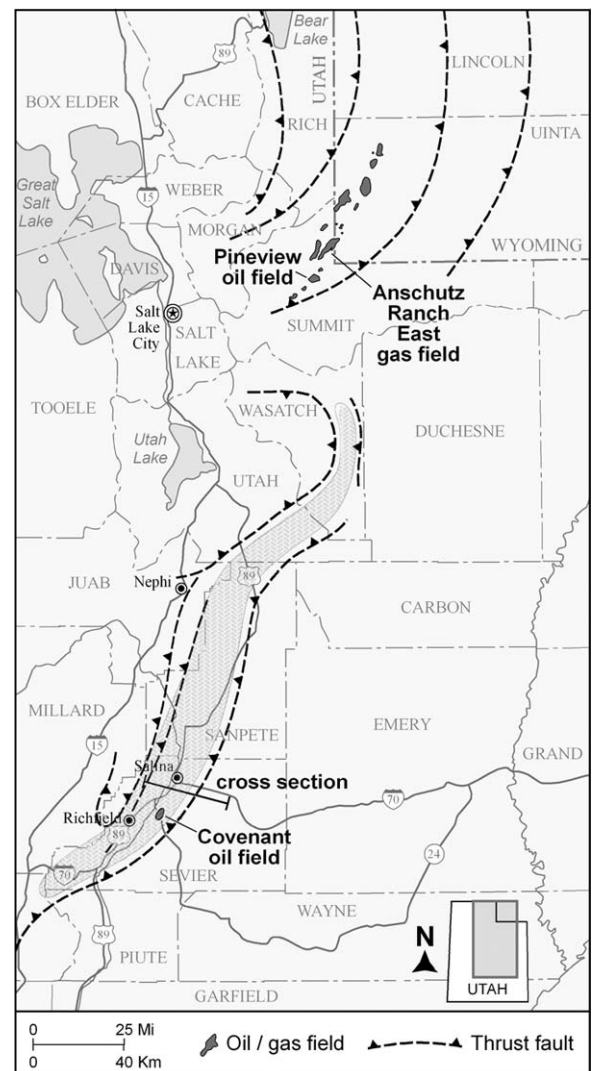
Wolverine Gas and Oil's Covenant Discovery

by Mike Seal, PTTC Rocky Mountain Region

Utah currently ranks as number 15 in the oil producing states, but if there are a few more discoveries like the Wolverine Gas and Oil Covenant Field in Utah, it could be moving up in the ratings. As reported in the April edition of the *AAPG Explorer*, the Covenant Field discovery in Central Utah opens up one of the most promising onshore plays in the United States in recent memory. It also highlights the importance of the independents to the U.S. Oil and Gas Industry - Wolverine purchased its acreage from Chevron in 1999 when the majors were pulling out of the Rockies.

Doug Strickland, exploration manager for Wolverine, is quoted as saying "I honestly expect this to be a billion-barrel province. I expect we'll find another 10 fields out there." Wolverine's discovery well, the 17-1 Kings Meadow Ranch, hit nearly 500 feet of Navajo Sandstone pay in Utah's Sevier County in late 2003. This well was completed and began producing in May 2004. A second well was completed in September 2004. It was announced at an SPE workshop in Salt Lake City on May 20th, that these two wells are currently producing 1,600 BOPD and 160 BWPD and to date, they have produced over 376,665 barrels of good quality, 40 degree gravity crude. The discovery well has produced 273,666 barrels.

Tom Chidsey, petroleum section chief with the Utah Geological Survey, has provided some background to this discovery. The last major new oil find in Utah was the 1975 discovery of the Pineview Field in the northern part of the state. Pineview has produced over 31 million barrels of oil and is still pumping nearly 15,000 barrels per month. Oil companies have been exploring central Utah for over 50 years with no success (58 dry



Central Utah thrust belt with colored band (crosshatch) showing greatest oil potential. Covenant oilfield, Sevier County, Utah.

Cont. on page 7



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focused technology insights in a very time and cost effective manner. There are generally several presentations on key technical aspects of a technology, followed by (wherever possible) field case studies illustrating key points. Both producers and the technology provider community participate. For those unable to attend, key information from workshops is presented online.

On a national level PTTC develops monthly "Tech Connections" columns for the *American Oil and Gas Reporter*. These columns feature key insights from recent regional activities. PTTC also works with producers and technology providers to develop monthly case studies in the "Petroleum Technology Digest" published in *World Oil*. PTTC also develops this newsletter, a 16-page quarterly effort that crisply captures technology insights in both the government and industry world.

There is a conscious effort to capture the fruit of all these efforts by making information available online at www.pttc.org. Accessing online information is one approach all in the industry should employ. However, PTTC recognizes there is no substitute for face-to-face meetings in the contact sport of technology transfer.

For those who utilize low cost computing power, PTTC conducts software training courses for popular packages by leveraging donations by software developers. Better trained users make these tools fly even faster and the answers are generally better too. The trend is clearly enabling all sizes of companies to participate in utilizing cutting edge technologies at affordable prices. All this adds up to increased reserves and production opportunities.

As an organization, PTTC is a network of people across the country. Localized Producer Advisory Groups provide industry guidance to regional resource centers at Universities and/or Geological Surveys who in turn perform the work of technology transfer. This network of people can be of value to those with a technology-related question. The people working within PTTC don't presume to know everything, but we have developed quite a network of "connections" that usually enable us to link inquirers with companies or individuals that can provide informed responses. Let us help you reduce the time required to find the information/data required to make informed technology decisions. And if you have an idea or topic of interest that could benefit a given challenge within the energy industry, feel free to contact us to discuss. ♦

Meeting Alerts

LIOGA Gulf Coast Prospect Expo

July 26-27, 2005
Lafayette, LA

www.lioga.com

Colorado Oil & Gas Association Rocky Mountain Natural Gas Strategy Conference & Investment Forum

Aug. 1-3, 2005
Denver, CO

www.coga.org/pageinpage/conference.cfm

Summer NAPE

Aug. 24-25, 2005
Houston, TX

www.napeonline.com/SNAPE/index.html

Hart Energy Conferences

Risk Management and Hedging for
Energy Professionals
Aug. 24-25,
Denver, CO

Executive Forum:
A&D Strategies & Opportunities
Sep. 1,
Dallas, TX

www.hartenergyconference.com/upstream-index.html

DOE/PTTC Microhole Technologies Integration Meeting

Aug. 17, 2005
Houston, TX

watch: www.pttc.org

AAPG Regional Meetings

Midcontinent
Sep. 10-13,
Oklahoma City, OK

Rocky Mountain
Sep. 24-26,
Jackson Hole, WY

Eastern
Sep. 18-20,
Morgantown, WV

GCAGS
Sep. 25-27,
New Orleans, LA

www.aapg.org/meetings

IOGCC Annual Meeting

Sep. 18-20, 2005
Jackson Hole, WY

www.iogcc.state.ok.us/EVENTS.HTM

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6,000th Site Cleaned Up By OERB

Started in 1993, part of the Oklahoma Energy Resources Board's (OERB) mission is to cleanup abandoned oilfield sites. Mike Terry, executive director, recently reported that OERB has completed cleaning its 6,000th site—a site in Oklahoma City that involved removal of concrete remnants of the old Oklahoma City Oil Field. In 2005 alone OERB plans to cleanup 1,200 sites which are selected by the Oklahoma Corporation Commission. OERB's cleanup costs are extremely low, averaging just \$4,000 per site. This is a testament to OERB's efficiency and cost control efforts.

Excerpted from *Tulsa World*, June 3, 2005. ♦

10 Steps to Explosives Safety in The Oilpatch

Field activity is up and experience level is down - a combination that can be dangerous. Whether its old hat or new to you, reviewing explosives safety doesn't take long and it makes sense. The 10 points highlighted in this article are:

1. Have a tailgate safety meeting
2. Check for stray voltage
3. Ground everything
4. Check firing circuit
5. "Safe" and secure the firing circuit/area
6. Arming safety
7. Power-up below 200 ft minimum
8. Secure power at 200 ft minimum
9. Assume a misfire
10. Clean up and inventory

Excerpted from "Ten Steps to Explosive Safety in the Oil Patch," *Well Servicing*, March/April 2005, pp. 53-54. ♦

Vapor Recovery, Capturing High Value Gas

Gas escaping from storage tanks is high value, usually averaging 2,500 BTU content. The volume of escaping gas depends on the oil volume cycling through the tanks, crude oil composition, separator operating pressure dumping to the tank, the tank configuration and seasonal daily temperatures. Sustained higher natural gas prices (with a 2.5 BTU multiplier) and technological advancements in vapor recovery units (VRUs) justify a producer taking a relook at VRUs. Two field examples described in the article confirm the economic potential of doing so.

- New Mexico: Two VRUs installed on two stock tank batteries, each emitting 90 Mcfd of 2,500 BTU gas into 45-psi sales line. Capital cost (excludes installation and operating costs) was recovered in 21 days (@ \$5/million BTU for 2,500 BTU gas).
- North Texas: One VRU installed on stock tank battery emitting 190 Mcfd of 2,400 BTU gas into 50-psi sales line. Capital cost was recovered in 14 days.

A calculator/economics tool on EPA's Natural Gas STAR program's website (www.ergweb.com/gasstar/analytical_tool/vaporrecovery.asp) can be an effective screening tool. For attractive opportunities, further interaction with VRU vendors is recommended.

VRUs are not a commodity item. While straightforward in concept, vapor recovery is challenging—pressures are minute and one is compressing a very wet gas stream. Compressor selection is critical. With wet gas, either rotary screw or rotary vane compressors are appropriate—reciprocating compressors do not do well. Unit packaging/integrated design helps avoid common installation errors.

With vapor recovery one or more tanks are manifolded to a common suction line and piped to the suction scrubber. An "independ-

ent" sensing line should be run from the most active or farthest tank to the sensing unit on the VRU. VRUs are configured to stop and start automatically, depending on tank pressure. Proper design includes a bypass system that will automatically divert discharge volume back to the suction scrubber.

Properly designed units shut down before any vacuum (pulls air/oxygen in, can implode tanks) is reached. If oxygen is entering the system, it is typically caused by an improperly designed package (no bypass system or improper pressure settings), improperly sealed tank hatches or leaking relief valves. Gas blanketing systems help alleviate other issues related to oxygen ingress. In the past, pilot valves were used as pressure sensors but they had operational problems. Newer electronic transmitters operate much more reliably at extremely low pressures.

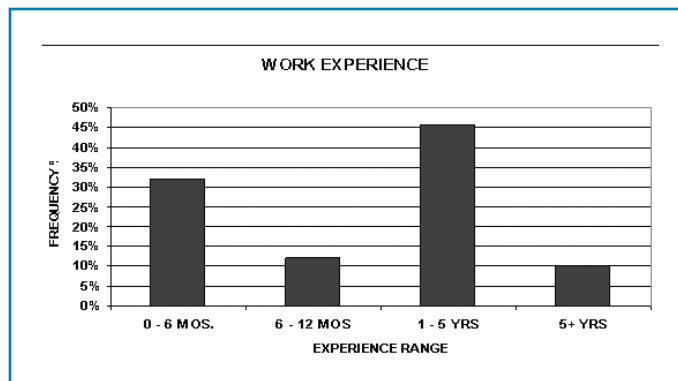
Other technological advances contributing to improved reliability include variable speed drives on electric-driven compressors, more sophisticated control systems, enhanced lubrication systems, and remote monitoring.

Excerpted from "Producers Tap Vapor Recovery For High-Btu Gas, Additional Revenue Streams," *American Oil and Gas Reporter*, March 2005, pp. 81-87. Note: A June workshop in Texas by PTTC, EPA STAR, Hy-Bon Engineering and TCEQ had a vapor recovery focus. Contact Sigrid Clift with the PTTC Texas Region about getting a copy of the workshop notebook at a nominal cost (sigrid.clift@beg.utexas.edu). ♦

International Petroleum Environmental Conference

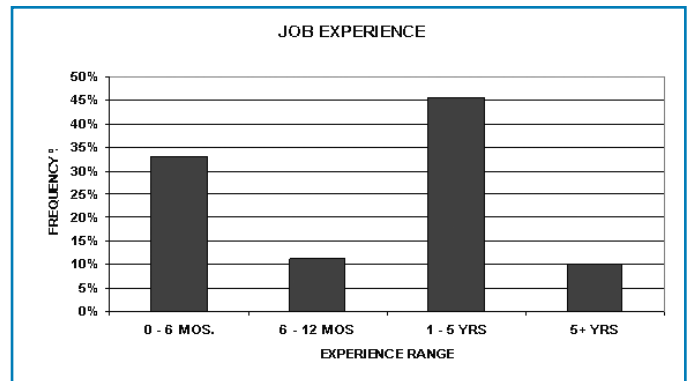
November 8-11, 2005
Houston, TX

<http://ipec.utulsa.edu/conferences.htm>



Work Experience on Rig When Injured

From *Well Servicing*, March/April 2005, reprinted with permission



Job Position Experience When Injured



PTTC recognizes that products and services featured in "Tech Transfer Track" may not be unique and welcomes information about other upstream technologies. PTTC does not endorse or recommend any of the products or services mentioned in this publication, even though reasonable steps are taken to ensure the reliability of information sources. Input can be directed to HQ@pttc.org.

2004 F&D Costs Show Marked Increase

A recent Banc of America Securities study revealed that finding and development (F&D) costs for both majors and U.S. independents increased markedly. For the majors 2004 fully loaded F&D costs were \$9.55/boe, up 36% from 2003. Equivalent F&D costs for independents, which were nearly the same as majors at \$9.65/boe, rose 21%. Factors responsible for these increases include a sharp escalation in acquisition and service costs, coupled with fewer added reserves and net negative reserve revisions.

Year	Finding & Development Cost \$/boe (\$/boe excl. reserve revisions)	
	12 Fully Integrated Majors	60 U.S. Independents
2004	9.55 (9.85)	9.65 (9.70)
2003	7.00	7.95

For the first time ever, the major's reserves added per well in the U.S. was less than the independents. The integrated majors replaced only 89% of production from all sources, including 81% via the drill bit. The independents replaced 218% from all sources, including 145% with the drill bit. Costs for proved property acquisitions, although increasing 28% from 2003 to \$8.25/boe in 2004, still remained lower than for finding reserves with the drill bit.

Excerpted from "BAS: Industry's 2004 Finding, Development Costs Soar," *Oil and Gas Journal*, May 16, 2005, p. 31-32. ♦

Avoiding Reserve Writedowns—CDs Available

With the support of several sponsors and participation of recognized industry experts, the Houston Geological Society sponsored four one-day short courses on different aspects of "avoiding reserves write-downs" and is now making those courses available on CD. The four aspects covered are:

- Part I: Reserve Definitions and Reporting Requirements, including coverage of issues the SEC routinely questions, SEC "Red Flags"

- Part II: Recommended Geological Practices, including coverage of common errors and recommended geologic methods and techniques
- Part III: Recommended Engineering Practices, including coverage of reservoir evaluation techniques, common errors and recommended practices
- Part IV: Recommended Petrophysical Methods, including coverage of wireline interpretation and use of core data, 10 causes/sources of Low Resistivity/Low Contrast response and how to adjust petrophysical evaluation to compensate, real world examples

Sold only as a four-CD set (\$120 - Part IV CD not available until after course presentation on Sep. 21). For more information visit Houston Geological Society's website www.hgs.org/en/art/?458. ♦

Hart's 2005 Meritorious Engineering Awards

In March Hart's announced the 2005 Meritorious Awards for Engineering Innovation. The awards recognize new products and technologies that offer innovation in concept, design and application. 2005 award winners, selected by an industry panel of judges, are:

- **Exploration:** Halliburton's Well Seismic Fusion (individual) and Schlumberger's StethoScope (systems)
- **Subsurface Characterization:** Schlumberger's PeriScope 15 (individual) and Halliburton's FasTest (systems)
- **Wellbore Construction:** Superior Manufacturing & Hydraulics and Global/Santa Fe Corp.'s UIBOP Valve Quick Change System (individual) and Halliburton's BOREMAX Drilling Fluid (system)
- **Completions:** Schlumberger's One-Trip Natural Gas Lift Solution (individual) and Baker Oil Tools Mono-Trip Cement thru Completion (systems)
- **Production:** Star Oil Tools' Modular Wellhead Gas Compressor (individual) and Weatherford's Red-Eye Watercut Meter (system)

- **Remediation:** Western Well Tools' Intervention Tractor (individual), Baker Oil Tools' FASTFrac Packer and Bridge Plug (individual), and Halliburton's DeepReach Coiled Tubing Service (systems)
- **Facilities:** Tronic's Wet Mate (individual)

Excerpted from "2005 Meritorious Awards for Engineering Innovation," *Harts E&P*, Mar 2005 viewable online at www.eandpnet.com/pdf/MEAwards2005.pdf. ♦

2005 Directory of State Regulatory Agencies

Time is money and quickly finding the right place/person in state regulatory agencies is important for busy independents. The *American Oil and Gas Reporter's* 22nd edition of "The American Directory of State Regulatory Agencies" strives to provide producers with the names and phone numbers of officials in major producing states who can provide answers and direct operators to the knowledge they seek in basic regulatory categories.

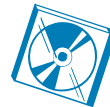
If you haven't kept the March issue, or don't get the magazine, contact them at 316-788-5796. Excerpted from "The American Directory of State Regulatory Agencies," *American Oil and Gas Reporter*, March 2005, pp. 143-153. ♦

SPE/IADC Panel on Mature Well Technologies

In a February drilling conference sponsored by SPE and the International Association of Drilling Contractors, one plenary session addressed "Mature Well Technologies." One panelist noted that "brownfields remain our greatest potential source of hydrocarbons." Responses to selected questions gathered from the audience of about 500 people using wireless voting pads are revealing.

What is the most pressing issue for future development of mature fields?

Technology	44%
Economics	33%
Trained personnel	22%



Can advanced technology be dumbed down?
77% said "Yes"

What type of company is best equipped to provide solutions for mature fields?

Integrated service companies	47%
Independent operators	19%
Niche technical solutions	11%
Major integrated oil companies	9%

Survey responses reveal consensus that service companies already have many of the tools, and that they can be adapted for mature fields. More standardization and increased regulatory streamlining will help decrease costs. Taking a total life cycle approach (looking ahead to the abandonment stage) when doing additional development in brownfields will also reap benefits.

Excerpted from "Mature Well Technologies Must Become Cost-Effective, Standardized," *Oil and Gas Journal*, Apr. 11, 2005, p. 39-42. ♦

Accelerating Technology Development & Deployment

A panel at the Offshore Technology Conference in early May noted how industry must find a way to compress technology development time from first-generation innovation to product commercialization to full deployment. In the past, this could take 15 to 30 years. Some thoughts expressed by panelists worthy of mulling over include:

- Vendors disproportionately shoulder cost while receiving inadequate share of the margin.
- Disruptive technologies require changing behaviors.
- Risk aversion is the largest obstacle to implementation.
- What we tend to call R&D is really "engineering." One really needs to distinguish between the two.
- Desperation (examining a problem under pressure) is the mother of invention.
- Applications-based technology (field experience) really makes a difference.
- Technology transfer is a contact sport (PTTC can attest to that).

Venture capital funding in the energy business is low, at least partly because of the long product lead times. Venture capital providers want developers to have customers first, yet without capital, developers find it difficult to

attract customers. Which comes first, the chicken or the egg?

Excerpted from "OTC: Technologies Require New Business Models," *Oil and Gas Journal*, May 16, 2005, p. 26-28. ♦

PTAC Online R&D Projects Database

The Petroleum Technology Alliance Canada (PTAC) has developed and now placed online an Oil & Gas R&D Projects Database, accessible at www.ptac.org/rdd/search.php. The database now contains over 150 new technology projects of interest to the industry and remains available to accept new submissions. This will allow industry to stay abreast of current developments and locate research projects aligned with their needs.

The database can be searched by industry sector (8 categories), technical area (17 categories), keyword, company/organization and researcher last name. Researchers may identify partners for complementary technologies and for applications development. Researchers who submit project information will have increased exposure to industry and government stakeholders.

To include an R&D project in the database, please submit an online, brief public domain summary of your R&D oil- and gas-related project. *Background information, input guidance and the input form are available at:* www.ptac.org/rdd1.html. ♦

Venture Capital in the Energy Industry

The 5th Edition of Research Reports International's "Venture Capital in the Energy Industry" report is a 190-page sourcebook that offers a detailed look at venture capital funding of emerging energy technologies. It strives to provide value for those looking for venture capital funding, those considering investing in venture capital funds, and to venture capitalists themselves. Among other things, the report:

- Identifies trends driving energy industry investments
- Details the key sectors receiving investment
- Reveals candidate funding criteria and valuation methodologies
- Discusses advantages and disadvantages of VC funding
- Profiles participants in energy venture capital

The report contains company profiles on 50 key venture capital firms and 41 portfolio companies. More information about the report is available online at www.researchandmarkets.com/reportinfo.asp?report_id=228247. ♦

Gas Well Dewatering with Concentric Coiled Tubing and A Jet Pump

A recent artificial lift advancement employs concentric coiled tubing and jet pump technology for gas well dewatering. With BJ Services' AquaLift™ Gas Well Dewatering System, the inner coiled tubing string is used to power a downhole jet pump, returning produced wellbore fluids and power fluid up the concentric coiled tubing annulus. Based on a venturi effect, system fluid pressure is converted into a high-energy jet stream, creating low pressure at the pump intake. The trick is to miniaturize the jet pump. A typical system consists of one-inch coiled tubing pre-set inside a string of 1.75 inch tubing, where the pump is attached to the bottom of the pre-assembled string.

AquaLift's best fit is in aging gas wells of shallow- to medium-depth. The main benefit of the system is its ability to draw reservoir pressure down to a lower level, which positively affects recoverable reserves. Typically the pump is set below casing perforations and immersed in produced water. Some reservoir pressure must remain, for instance a medium-depth well of 5,000 ft should not be much below 100 psi. At 10,000 ft, the pressure limit might be 250 psi.

Excerpts from "Priming the Pump," *New Technology Magazine*, March 2005 (see www.ntm.nickles.com). Further information on BJ Services' AquaLift system viewable online at [www.bjservices.com/website/ps.nsf/0/3BDA3895D04825F286256F43006BF.AA7/\\$file/AquaLift+System.pdf](http://www.bjservices.com/website/ps.nsf/0/3BDA3895D04825F286256F43006BF.AA7/$file/AquaLift+System.pdf). ♦

GeoScience World, A New Information Portal

GeoScienceWorld (GSW), a new information portal containing GeoRef plus 30 leading journals from the world's foremost geoscience organizations, was launched (www.geoscienceworld.org) in late February. The initial GSW collection incorporates the complete text of 30 journals from 22 societies and institutes from six countries. Founding organizations include: American Association of Petroleum Geologists, American Geological Institute, Geological Society of London, Mineralogical Society of America, SEPM-



Society for Sedimentary Geology and the Society of Exploration Geophysicists.

GSW provides access to scientifically peer-reviewed full-text articles from high impact geoscience publications with linking between cited references and articles within the GSW database and outside of GSW through CrossRef. The ability to search the database and review abstracts of GSW articles is an open access activity.

Although the core value of GSW is the collection of articles and data set linkage, GSW also is integrated with GeoRef, the bibliographic search database published by AGI that includes information on over 3500 publications. Direct linkage exists from a GeoRef search to all articles within GSW and cross linking to references outside of GSW is accomplished with CrossRef. GeoRef integration results in a search of geoscience and allied publications that is as complete as possible. Literally no stone is left unturned. GeoRef also provides linkage to other open access digital files, such as USGS, State Surveys, etc.

For more information, please contact GSW's Executive Director Don Hemenway (hemenway@geoscienceworld.org).

Planning EOR Projects, Apply Lessons Learned

Crude oil prices are strong and consensus is that they will remain so. In this environment many operators are taking a relook at their mature oil reservoirs for enhanced oil recovery (EOR) potential. There is wisdom in applying general lessons learned from past EOR projects. These lessons learned include:

- *The Planning Process.* Economic studies, reservoir characterization and engineering design, and reservoir performance modeling should proceed in parallel.
- *Reservoir Performance Modeling.* EOR modeling requires more data and more time than primary- or secondary-processes, but it's worth it since the penalties for being wrong are much higher.
- *Economic Studies.* Start with simple screening models to aid in process selection and add sophistication as the project develops.
- *Process Selection.* Realize that EOR processes do one of two things—improve sweep efficiency or improve displacement efficiency (or both). Know what will be at work in your reservoir.

- *Reservoir Characterization.* Build a geological and petrophysical description of the reservoir and know the impact on EOR processes. Not understanding the reservoir adequately is probably the most common cause of failure in past EOR projects.
- *Engineering Design.* Know which parameters will influence economic success the most, then focus effort there.
- *Pilots, Field Tests.* These are needed when there are important parameters and variables where more needs to be known. Pilot design should target getting those answers. Good pilots use observation or monitor wells. Targeted pilots can get answers in months, not years.
- *Project Implementation.* Ongoing active surveillance is a partnership between operations and engineering. Anticipate that adjustments will be needed and make them.

Excerpted from "Planning Successful EOR Projects," *Journal of Petroleum Technology*, March 2005, p. 28-29. Article accessible online at www.spe.org/spe/jpt/jptmonthly-section/0,2440,1104_11038_3623293_3-630284,00.html.

S3GPS, A Unique GPS Service

Most in industry are convinced of the value of knowing where there assets are. The challenge for busy operators is sorting through more than 250 vendors to find the right match. That is where S3GPS, which was formed in 2003, enters the picture. Much like a general contractor, S3GPS lets a customer explain what it wants, then they go to work interviewing the "right" vendors for the job. To the customer, S3GPS's services are pro bono—they are compensated by the vendors for their matching. This service helps time-stressed small- to mid-size companies without IT staff make informed decisions and gets them aligned with appropriate vendors. Operators should note that, due to declassification of military technology, GPS costs have decreased significantly in recent years.

Excerpted from "New Service Providers Enter Oil Field," *American Oil and Gas Reporter*, March 2005, pp. 67-ff. Visit www.s3gps.com for more information.

SPE Begins eMentoring Program

The Society of Petroleum Engineers (SPE) recently launched an eMentoring program, a program designed to be a convenient and effective way to connect young professionals (fewer than five years in the industry) and

students with more experienced members. In addition to being mentored, young professionals have a unique opportunity to serve as mentors to students as well. eMentoring provides the advantage of transcending geographic boundaries and time constraints through online communication. Mentors are encouraged to communicate with mentees on a regular basis and initiate discussions offering guidance and advice. Through frequent communication, mentors will foster trust by making mentee's feel their questions and concerns are carefully considered.

Interested SPE members must register as mentors; mentee registration will soon follow. Mentors and mentees will then be matched and the mentoring process begun. This represents an opportunity for both new and seasoned professionals to contribute to their profession, plus there is the potential for building lifelong relationships.

For more information visit www.spe.org/spe/jsp/basic/0,,1104_3983211,00.html.

What's New In Artificial Lift

Each year *World Oil* features a series by James Lea and Herald Winkler of Texas Tech University about new developments in artificial lift. This year Bob Snyder co-authored the two-part series that appeared in the April and May issues of *World Oil*. Considering that artificial lift is essential for the vast majority of U.S. wells, operators are encouraged to review the highlighted developments.

A partial listing of developments (with issue indicated) includes:

- Sidestream Flush Restrictor for Improved Chemical Injection, Omega Technologies, Inc. (April, p. 60)
- Low Horsepower Drivehead for PCP pumps, Baker Hughes Centrilift (April, p. 64)
- Insertable High-Volume PCP pump, Arrowhead (April, p. 64)
- PAL Improved Casing Plunger, P.A.A.L. LLC (April, p. 71)
- High-Volume ESP Gas Separator, Baker Hughes Centrilift (May, p. 63)
- Insertable Diaphragm Pump, SmithLift (May, p. 67)
- Data Recording with FieldDIRECT Services (expanded to AL data, chemical usage, etc.), IHS Energy (May, p. 69)

View articles online at www.worldoil.com/Magazine/Magazine_Content.asp.

holes) until now. The major reason for this is the extremely complex geology of the central Utah thrust belt, also referred to as the "Hingeline."

Throughout this area's geologic history, the Hingeline has marked a pronounced boundary between two different terrains. During Late Proterozoic to Devonian time, it marked the boundary between a very thick layer of sediments deposited in western Utah and a thin sequence in eastern Utah. Later, the Hingeline coincided with the eastern edge of a mountain belt that formed during the Sevier Orogeny, a mountain-building period that took place during Cretaceous to Tertiary time. Today it marks the general boundary between the Basin and Range and the Colorado Plateau physiographic provinces. Thrust faults and large anticlines that formed during the Sevier Orogeny provide the trapping mechanism for the Pineview oilfields.

Daniel Schelling, structural geologist and David Wavrek of International Petroleum Systems gave specifics at the SPE meeting. The seal is the middle Jurassic Arapian, a 5,500-ft mudstone with halite, gypsum and anhydrite layers. These layers are good reflectors, making seismic interpretation more difficult. The reservoir is the lower Jurassic Navaho, a 1,200-ft aeolian sandstone. They consider the source rock to be of Mississippian age whereas the previous paradigm was that it was the Permian Phosphoria. The trap is described as large scale fault bend fold.

The actual discovery was an early Christmas gift. On December 22, 2003 the operators hit the Navaho Sandstone at 5,800 ft instead of the anticipated 7,200 ft. By December 24 they had 500 ft of oil shows and had established the NAV1 reservoir with flow and correlation to the Rangely Weber Oil. The petrophysics of the discovery well are gross

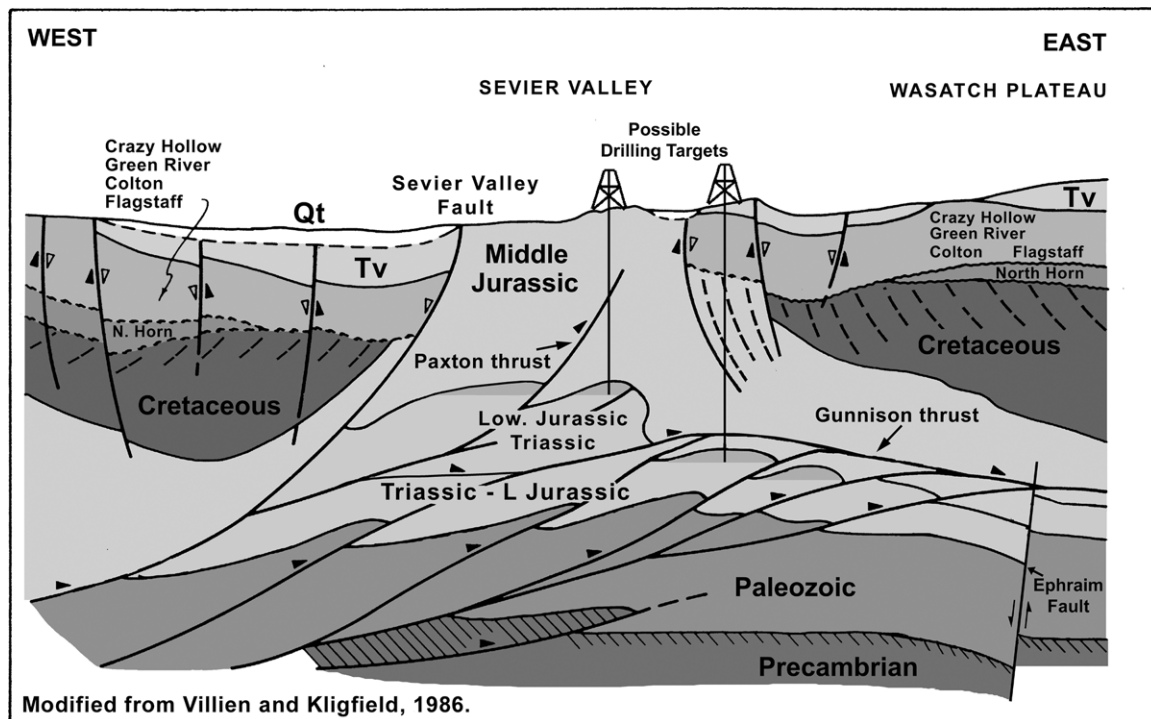
pay 487 ft, net pay 424 ft, average porosity 12 percent and water saturation 38 percent. The permeability was reported as 100 mD, but they were unable to comment on how much natural fractures contribute to this permeability. Potential reserves are estimated at 75-200 million barrels for this 1,600 acre field, and they are hoping for 50 percent oil recovery. The finding costs were \$5.5 million split among 10 partners. Estimated development costs for the field are \$56 million.

Doug Strickland gave further information at an RMAG luncheon meeting in Denver on June 3. Doug described how Wolverine used the good dipmeter data from a Chevron well drilled to 17,000 ft in 1981, and conventional seismic, to determine that they could drill 1,500 ft higher on structure. Drilling motors and modern mud systems kept the well on target through the highly deformed and salt-rich Arapian shale. The Navaho sandstone did not show up on seismic, so they had to rely on the deepest salt layer in the Arapian as a marker. Formation water is fresh with an Rw of 0.4-0.6. The reservoir has a water drive and they expect to have a total of 12-15 wells on 160-acre spacing. Production is projected to reach 5,000 BOPD by August of 2005.

Wolverine has 500,000 acres under lease in central Utah and has identified 25 drillable structures.

To summarize, a story of how patience and perseverance can pay - in this case, 500 ft of pay. ♦

Note: With increased activity in Utah, both industry and government agencies are finding the website (<http://geology.utah.gov/emp/pump>) developed by the Utah Geological Survey in a DOE-supported PUMP II project quite helpful.



Schematic east-west structural cross section through Sevier Valley (line of section shown on map) just north of the 2004 discovery of the Covenant oil field showing potential exploratory drilling targets in anticlines between thrust faults. Modified from Villien and Kligfield, AAPG Memoir 41, 1986.

Some Oilfield Training Program Options

Shortages of field workers are one of several factors limiting the activity level that operators can maintain. Through some Department of Labor (DOL) grants a couple years ago, there have been training programs at work meeting those needs—at Midland College in West Texas, at San Juan College in Farmington, NM, and at the High Plains Technology Center in Woodward, OK. This article strives to inform operators about those programs, plus alert them to a new effort emerging in Kansas. Note that each program has a special flavor/approach. One can match the approach fitting your situation. PTTC is well aware that other field training programs of some nature exist. We invite other providers to submit information to PTTC (Lance Cole, e-mail lcole@pttc.org) and we'll provide more information in future issues.

Midland College Program

Following receipt of its DOL grant, Midland College began offering oilfield training focused on the service industry in August 2003. This sector was particularly targeted because as a whole it has had the continuing problem of inadequate levels of skilled workers due to historically volatile market conditions. Midland College targets the expected areas in Texas, but it is notable that individuals from New Mexico, Oklahoma, Florida, California, Colorado and Illinois have participated.

Training combines classroom and hands-on equipment training directed toward entry-level workers. Combined with safety topics, this project offers actual hands-on training on a well servicing unit. Currently there are four, 40-hour courses held weekly. These classes include a Universal Oilfield Safety Class, Well Servicing Class, Well Servicing Applications Class, and Drilling.

- Universal Oilfield Safety Class covers a wide range of safety topics that are oilfield relevant such as H₂S, CPR and first aid, to Slips, Trips and Falls.
- The Well Servicing Class and the Drilling classes cover topics that prepare students for entry level oilfield positions such as a lead tong man or roughneck.
- The Well Servicing Applications Class is a hands-on training class that is held the second week of every month at Key Energy facilities. Students receive at no cost to the student, steel-toed boots, coveralls, hard hats and safety goggles.

Project staff network with employers to assist students in obtaining employment at the completion of the classes. Some companies refer prospective students to the project with the promise that if they successfully complete the project they will then hire the students.

Further information is provided on Midland College's website www.midland.edu/~pbeep.

San Juan College Program

Leveraging a DOL grant received in 2003, San Juan College's Regional Energy Training Center provides a variety of oilfield training programs. Beyond the expected rig/service crew training, there are specific lease operator and gas compression technician programs in place.

- Rig Operations Training. Includes safety and hands-on rig experience training for new employees/rig workers. They also provide developmental training programs for current derrick men and rig operators.
- Petroleum Technology Training Programs. Oil and gas field personnel are trained in the classroom and hands-on in all aspects of production operations. Included are the Lease Operator Training Program (5-1/2 month), artificial lift training and gas measurement.

- IADC WellCAP Certified Well Control Training (BOP). Training in drilling, workover/completion, underbalanced, coiled tubing, snubbing and wireline well control operations. Individual and combined classes are available.
- Natural Gas Compression Program. Covers the mechanical and technical aspects of compression technology specifically related to the natural gas industry. Students train in a classroom/shop setting, and work with a sponsoring company in the field.

Further information is provided on the Training Center's website www.sjc-retc.com.

The Emerging Kansas Program

Recently the Kansas Independent Oil & Gas Association (KIOGA), in cooperation with the Kansas Department of Commerce and several community colleges across Kansas, teamed up to develop basic, entry-level training for the drilling and well servicing sectors. Participating community colleges (and the person to contact for information and registration) are:

Pratt Community College, Pratt (Jerry Burkhart: ph 620-450-2715, e-mail jerryb@prattcc.edu)

Seward County Community College, Liberal (Dale Reed: ph 620-626-3137, e-mail dreed@sccc.edu)

Ft. Scott Community College, Fort Scott (Paul Osborn: ph 913-294-4178 ext 205 e-mail Paulo@fortscott.edu)

High Plains Technology Center in Woodward will be involved in presenting a component of the training. Further information is provided on KIOGA's website www.kioga.org.

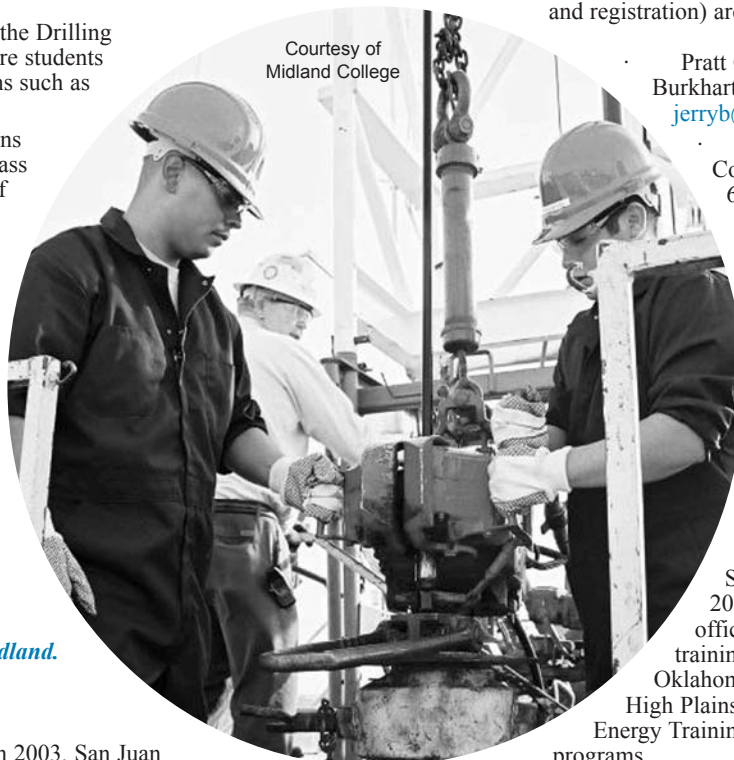
High Plains Technology Center

Since receiving its DOL grant in 2003, High Plains has served as DOL's official Midcontinent site for oil and gas training with a training area including Oklahoma, Kansas and the Texas Panhandle. High Plains works with IADC, AESC, the Energy Training Council, and others in developing programs.

- Floorhand Training for Well Servicing
- Floorhand Training for Oil and Gas Drilling with IADC Rig Pass certification
- Oil and Gas Production Training - this includes specific programs for Roustabouts, Pumpers and Technical Interns

An extended article on the High Plains program was published in the Dec 2004 issue of Oklahoma's Marginal Well Commission available online at www.marginalwells.com/MWC/MWC/December_2004_Color.pdf.

Further information is provided on High Plains' website www.hptc.net/ogtc.asp.





Four-"E" Bridge to the Carbon-Free Energy Future

In last issues State-of-the-Art article, PTTC focused on DOE's carbon sequestration partnerships. This resulted in inadequate coverage of the Gulf Coast Carbon Center, an industrial-academic consortium in Texas.

The Gulf Coast Carbon Center (GCCC) merges expertise in four key areas—Energy, Environment, Economics, and Education—to find optimal ways to provide sustainable energy in the future. The GCCC is an industrial-academic consortium led by the Bureau of Economic Geology at The University of Texas at Austin and partly funded by the Jackson School of Geosciences, electric power producers Entergy and NRG, gas handler Praxair, CO₂ pipeline and EOR specialist Kinder Morgan, and international energy companies BP and Chevron.

In the near term we need the process of carbon capture and storage (CCS) to reach the environmental goal of reducing risks resulting from buildup of CO₂ in the atmosphere. Fossil fuel usage is increasing, and the greatest opportunity for quickly reducing the impact of this increase is to capture CO₂ at large point sources such as electricity generators and industrial sites and inject it into the subsurface underlying many of these facilities.

Strong collaboration with energy businesses is key to successful implementation. Beneficial use of captured CO₂ to enhance oil production, coalbed methane generation, and possibly gas production will speed implementation. Expertise in reservoir characterization and multiphase flow modeling available in the hydrocarbon production industry is needed to identify geologic storage sites where CO₂ will be retained in the reservoir for long enough periods to influence atmospheric concentrations.

An economic plan for CCS is critical for rapid and widespread implementation. Credit trading, penalties, or incentives are needed to motivate a market. The new Center for Energy Economics, a group led by Michelle Michot Foss who recently joined the Bureau of Economic Geology, will assess commercialization issues.

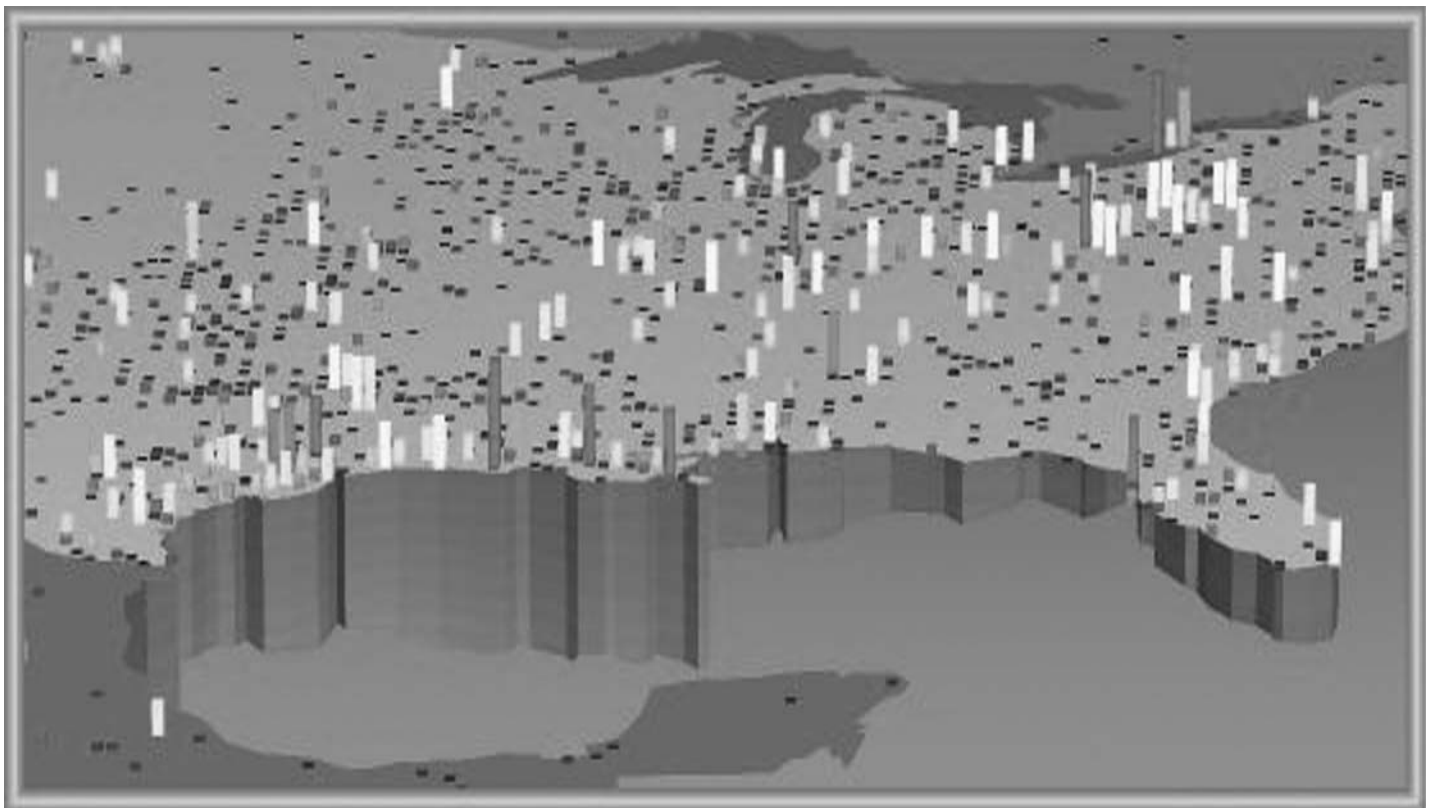
Education supported by research is a critical role of the GCCC. Exchange of information within a diverse group of industries, the research community, other stakeholders, and the public is required to build this industry. For example, oil producers need to know where and when CO₂ capture will become feasible to plan for CO₂ floods, and capture experts need insight into the economics of using reservoirs in decline. Policy makers need to consider how commercialization could benefit or harm private- and public-sector employment and tax bases. Regulators

need to explore the synergy between waste disposal and commercial use of the CO₂ in the subsurface and the ways existing regulation can be used to support the process on an unprecedented scale.

The initial U.S. experiment in geologic storage, the Frio Pilot test, merges expertise in energy, environment, economics, and education. The Bureau of Economic Geology drew on experience provided by 16 research and service organizations, including 4 national labs (LBNL, ORNL, NETL, and LLNL), the U.S. Geological Survey, Schlumberger, Praxair, Paulsson Geophysics, Sandia Technologies, the Alberta Research Council, and the Australian CO₂ CRC. The Frio Pilot tested the efficiency of the subsurface in storing CO₂ in nonproductive sandstones to assure that the process would reach environmental goals. The project was leveraged by data and infrastructure from five decades of hydrocarbon production in the host site at South Liberty field, including donation of 3-D seismic, historical well logs, and well access by Texas American Resources.

The figure shows the favorable relationship between point sources of CO₂, shown as bars above the land surface, and the thickness of the sedimentary wedge in North America. ♦

Content provided by Sue Hovorka (Susan.Hovorka@beg.utexas.edu), Bureau of Economic Geology, The University of Texas at Austin. Website: www.gulfcoastcarbon.org.





Recovery Method for Alaskan North Slope Heavy Crude

Alaska's North Slope boasts a massive heavy oil resource, as much as 36 billion barrels of OOIP within the Ugnu, West Sak, and Schrader Bluff formations. These reservoirs lie tantalizingly in reach of existing infrastructure, but recovering them has proven daunting. At a depth of 3,000-3,500 feet, these formations' proximity to the subsurface permafrost renders the already low-gravity crudes extremely viscous. Low formation strength presents an additional hurdle to high recovery and productivity rates. North Slope operators thus far have focused on the less-viscous crudes in the West Sak and Schrader Bluff heavy-oil formations, where viscosities range from ~30 centipoise to ~3,000 centipoise. Combined original-oil-in-place volumes for these two formations total about 10-20 billion barrels.

There has been some success producing the less-viscous crudes in the West Sak and Schrader Bluff formations by injecting slugs of water alternating with gas (WAG). There are several gas streams available on the North Slope that contain natural gas liquids and carbon dioxide. Natural gas liquids have been used for years as part of a miscible gas EOR effort at Prudhoe Bay. DOE-funded a three-year research project at the University of Houston to develop tools (compositional model, new relative permeability model, reservoir simulator, etc.) for modeling the optimum WAG flood design for these shallow-sand viscous oil reservoirs. In their final project report, researchers also noted that horizontal wells offered great potential for increasing productivity. Potential for increased productivity with electromagnetic heating was also noted.

For more information see DOE's Tech Line www.fe.doe.gov/news/techlines/2005/tl_alaska_oil.html.

Intelliserv's High Speed Drill String Telemetry Network Completes 5th Test Well

Working for BP America Inc. (BP), an IntelliServ network consisting of five-inch telemetry drill pipe (IntelliPipe) and associated telemetry drill string components, including heavyweight drill pipe, drill collars, roller-reamers and drilling jars, was used to drill from surface to a total depth of more

than 13,000 feet. The network successfully provided high-speed, real-time telemetry services throughout the drilling program, with live data sent via satellite to engineers in Provo and Houston.

"The IntelliServ network performed extremely well during the latest field trial, providing a customer data rate of 66,000 bits per second. It also demonstrated reliability comparable to mud pulse telemetry, with a mean-time between failure of over 800 hours," stated Michael Reeves, IntelliServ. Reeves went on to indicate that the same telemetry tubulars had been used to drill four previous test wells and the IntelliServ network has now accumulated over 3,000 operating hours in extremely harsh conditions, including very high-shock air drilling.

To date, IntelliServ tubulars have been used to drill more than 50,000 feet of hole for BP, demonstrating handling characteristics and mechanical reliability equal to Grant Prideco premium drilling tubulars. An upgrade enabling customer data rates of one million bits per second has been pilot tested and will be implemented later this year.

Excerpted from email alert by New Technology magazine (www.ntm.nickles.com/).

Newfield Increases Monument Butte Oil Production

Newfield Exploration Co. estimates more than 1 billion bbl of oil is in place in Utah's Monument Butte oil and gas field in the northern Uinta basin. Newfield purchased their Monument Butte interests in Aug 2004 from Inland Resources. Since then, Newfield estimates reserves are up 16% and production averages 1,200 bopd, up 12%. Projections with an active drilling program (175 wells in 2005) are for production to increase to 10,500 bopd by yearend. That is a far step up from 300 bopd when Lomax Petroleum's DOE Class 1 waterflood demonstration project in the Monument Butte Unit started in 1992. Work in the DOE project identified several technological keys to successful waterflooding of this low permeability, high heterogeneity reservoir containing high paraffin oil.

Excerpted from "Newfield Lifts Utah Monument Butte Oil Flow," *Oil and Gas Journal*, Apr. 4, 2005, p. 44. See also (1) Slide 7, Newfield presentation at IPAA Conference in April 2005 (www.newfld.com/pdf/IPAAConfApril2005.pdf) and (2) DOE's fact sheet on early work as Class 1

Demonstration Project (www.netl.doe.gov/scngo/Petroleum/publications/projfactsheets/E&P/Inland04.pdf).

Varied Technologies Reported in Latest GasTIPS Issue

- Enhancing Microbial Gas from Unconventional Reservoirs
- High Temperature Electronics, One Key to Deep Gas Resources
- Enhanced Wellbore Stabilization and Reservoir Productivity with Aphron Drilling
- Fluid Technology
- Fiber Laser Offers Fast Track to Clean Perforations
- Safety Net Royalty Relief Analysis of Natural Gas and Oil Production and Revenues
- Regulatory Considerations in the Management of Produced Water, A U.S. Perspective
- Volume-Optimized Compressed Natural Gas

Articles in Vol. 11, No. 2 accessible online at www.netl.doe.gov/scngo/Reference%20Shelf/GasTIPS/GasTIPS.html. GasTIPS is a publication of Gas Technology Institute, U.S. DOE and Hart Energy Publishing, LP.

Fuzzy Exploration Tool Advances Further

In a DOE-supported project the Reservoir Evaluation and Advanced Computational Techniques (REACT) group at New Mexico Tech's Petroleum Recovery Research Center developed a Fuzzy Exploration Expert (FEE) tool, relying on computer databases information and digital maps developed by neural networks to mine and use a wide variety of information and "fuzzy logic" to provide realistic estimates of risk of drilling and workover opportunities. The first system developed for the Brushy Canyon in the Delaware Basin proved reliable and a second system was developed for Siluro Devonian Carbonates in the Permian Basin. It too proved successful. These two systems were developed using knowledge gained from interviewing experts with experience in these plays.

REACT is now working to build similar systems for more plays in the Permian Basin. Input from experienced explorationists about exploration techniques in different Permian Basin plays is being sought. When appropriately honed through sequential questionnaire



techniques (Delphi method), this feedback will form the knowledge foundation for FEE application in these additional plays. The customizable system will also allow users to further customize it by modifying, adding or removing rules quickly and easily.

Information on the FEE tool concept is available online at http://baervan.nmt.edu/research_groups/REACT/expert/expert-main.html. Companies wanting early access to project software and results are encouraged to contact REACT's Robert Balch (ph 505-835-5305, balch@prrc.nmt.edu) about joining the Consortium. ♦

Pre-Commercial Testing of Ultrasonic Well Stimulation Device

In the past R&D scientists working on ultrasound technology have been unable to make the transition from the laboratory to a functioning commercial oilfield application. A Klamath Falls group has broken through this barrier in testing at RMOTC. Two different units, a 42-mm diameter tool designed to pass through production tubing and a 100-mm diameter tool for casing, were tested. The technical characteristics of both units were confirmed in relation to their capacity to generate and transmit stable signals for one to two hours, the time period representing the time expected to treat a damaged well. The system proved to be robust, showing no signal instability, attenuation, heat buildup, or other problems. Positive results in this testing are being used to design further testing.

Excerpted from RMOTC's 2005 Spring Newsletter (www.rmotc.com/Today/NewsLetter.html). For more information contact RMOTC's Bryant Mook at Bryant.Mook@rmotc.doe.gov. ♦

Digital Bibliography of Unconventional Gas Research Reports

DOE's National Energy Technology Laboratory (NETL) has identified and catalogued all the historical unconventional gas project reports produced over the last thirty years. Over two hundred boxes of archived reports on Devonian Shale, Tight Gas Sand, Deep Source Gas, Coal Mine Methane and Natural Gas Hydrates have been sorted and the references documented in a digital bibliography. This reference material is extremely

useful to producers interested in developing similar resources today.

For further information contact DOE's Tom Mroz (phone 304-285-4071, email tmroz@netl.doe.gov). ♦

Microhole Technologies Moving Forward

Companies receiving awards in DOE's Microhole Technology development program are moving forward in multiple fronts to develop and test rigs and many system components. This should ultimately make microhole (very small diameter) wellbores a reality. The economic driving force for lower cost drilling with minimal footprint that would enable drilling wells for lower reserve volumes is powerful, so industry is also moving forward in many arenas on its own.

With simultaneous action by multiple players on many different fronts, there is the risk that components will not "fit" together. With that risk in mind, PTTC will be working alongside DOE in the coming year to enhance communication and interaction among those companies/individuals developing technologies. With improved communication and awareness, the chances for all the components being simultaneously developed to be "compatible when integrated" improves greatly.

Key elements of this Integration Initiative will be (1) integration meetings involving the players, (2) developing a state-of-the industry profile of microhole technology, and (3) developing and maintaining a web information/communication system. To accomplish the above, PTTC will work hard to identify, expand and connect those involved in technology development. Get people to talking in a timely fashion and many \$ of rework can be avoided. An initial Technology Integration meeting is scheduled on Wednesday August 17th in Houston. Producers are encouraged to "stay in the loop" by attending this and subsequent meetings. Watch PTTC's website for further information.

DOE's Phase I Microhole Awards (mid 2004)

The first set of projects focuses on field demonstrations and development of technology that uses coiled-tubing drilling:

- Demonstrations of existing 43/4-in. commercial microhole technology.

- Built for-purpose microhole coiled-tubing rig (Schlumberger IPC, Sugar Land, Tex.).
- Self-contained zero discharge drilling-mud system (Bandera Petroleum Inc., Tulsa).
- Microhole coiled-tubing bottomhole assemblies (three projects: smart steering and LWD system developed by Baker Hughes Inteq, Houston; radar navigation and radio data transmission systems developed by Stolar Research Corp., Raton, N.M.; and a downhole drilling tractor developed by Western Well Tool Inc., Anaheim, Calif.).
- Microhole completion and production equipment (through-tubing artificial

For more information see DOE Tech Line www.fossil.energy.gov/news/techlines/2004/tl_microhole_tech_selections.html.

DOE's Phase II Microhole Awards (Jan 2005)

The 10 projects receiving awards in early 2005 test coiled tubing rigs and continue development of various technologies needed in various parts of the system:

- Drilling 3 wells with composite coiled tubing drilling system (Geoprober Drilling Inc.)
- Field test a next-generation microhole coiled tubing rig (Gas Technology Institute)
- Develop elastic-phase, self-expanding tubular technology (Confluent Filtration Systems LLC)
- Develop mechanically-assisted, high-pressure waterjet drilling tool (Tempress Technologies)
- Increase reliability of bottomhole assemblies (CTES LP)
- Develop high-power turbodrill (Technology International Inc.)
- Combine existing MWD/LWD into integrated, inexpensive measurement system (Ultima Labs Inc.)
- Develop wireless system for steering (Baker Hughes Oilfield Operations Inc.)
- Develop counter-rotating motor drilling system to improve penetration rates by 25-60 percent (Gas Technology Institute)
- Develop self-expanding, high-flow sand screen (Confluent Filtration Systems LLC)

For more information see DOE Tech Line www.netl.doe.gov/publications/press/2005/tl_microhole_selections.html. ♦



Interview with Denis Gaudet, Director of Technology Transfer, PTAC Petroleum Technology Alliance Canada

Recent interviews have focused on technology and deployment in the U.S. Recognizing the relevance of the moving technology window in Canada, PTAC invited Denis Gaudet with PTAC to share what's happening there.

Headquartered in Calgary, PTAC is a not-for-profit association created in 1996 to facilitate innovation, technology transfer and collaborative research and technology development, demonstration and deployment for a responsible Western Canadian upstream hydrocarbon energy industry (www.ptac.org). PTAC's objective is to leverage intellectual and financial resources, applying them to solve industry problems, capture opportunities, and improve industry performance. A collaborative structure brings PTAC stakeholders together to identify industry problems and opportunities and define research projects to deal with them. PTAC's mandate includes innovation and technology transfer and aims to increase the adoption of eco-efficient and greenhouse gas-reducing technologies.

PTAC launched the *Spudding Innovation: Accelerating Technology Deployment in Natural Gas and Conventional Oil* (www.ptac.org/techinnp.html) project to assist in defining technology needs and the related government framework and research contributions necessary to further the development of conventional O&G reserves and unconventional gas reserves in Alberta. Key recommendations include:

- Develop a strategy with compelling business case
- Build a technology roadmap
- Change the way research, development and deployment (RD&D) is done by integrating and focusing research efforts. In addition, industry stakeholders should develop a one-channel funding mechanism to save time, focus resources and ensure accountability
- Improve market incentives to include earnable, awardable royalty credits and revamp the current system of income tax credits.

The Alberta Department of Energy (ADoE) has subsequently developed and launched the

Innovative Energy Technologies Program (IETP) in 2004. Citing the *Spudding Innovation* assertions, the ADoE says that Alberta's recoverable reserves of conventional oil could be increased as much as 14% of OOIP or some 8.7 billion barrels.

IETP offers royalty adjustments of up to \$200 million over five years to specific pilot and demonstration projects that use new or innovative technologies to increase environmentally sound recoveries for existing reserves and encourage responsible development of new oil, natural gas and in situ bitumen reserves. The program is also designed to assist industry to find commercial technical solutions to the gas over bitumen issue that will allow efficient and orderly production of both resources. By sharing the financial risks, IETP will encourage innovation and quicker commercialization of new technologies.

Producers and service providers can both apply for funding. Evaluation criteria are based on a demonstration of compliance with Alberta Energy's objectives of developing innovation, encouraging dissemination of technology and providing positive economic benefits to the people of Alberta without causing harm to the environment. The first round of funding was allocated in spring 2004, and applications will be accepted for the second round of funding until October 31, 2005.

A second study released in March 2005 by PTAC through its Technology for Emission Reduction and Eco-Efficiency (TEREE) steering committee examined social, regulatory and other non-technical barriers to the deployment of emissions reduction and related technologies in natural gas and conventional oil with a primary focus on the Western Canada Sedimentary Basin. PTAC's *Barriers to Deployment of Environmental Technologies* report (www.ptac.org/eet/dl/eetreport0401.pdf) proposes ways and means to overcome barriers preventing upstream O&G companies from investing in emission-reducing and other environmental technologies. PTAC President Eric Lloyd encourages industry to begin viewing envi-



ronmental technologies not as a cost, but as an economic opportunity.

The *Barriers* report suggests greater government tax incentives are needed to promote environmental innovation and direct funding support, particularly during the demonstration phase of technology commercialization, to move innovative technologies toward deployment. Furthermore, the report recommends the formation of a one-window approach to access funding, and the creation of a database for best practice environmental technology. Producers have expressed the need to better discern the best practice technologies from all of the environmental technologies marketed to them. Finally, the report recommends regulatory alignment with deployment of best practice technologies and improved communication of progress being made.

Currently, PTAC is working on another recommendation from the *Spudding Innovation* report, an Unconventional Gas Technology Roadmap for industry, government and other stakeholders in the Western Canadian Sedimentary Basin. This project's goal is to help focus attention on the long term potential for unconventional gas reserves, and to galvanize a coordinated and cooperative approach to technology development by building a technology roadmap. The roadmap will outline the business and societal challenges to development, the state of the current recovery technology, and the best avenues for improved or new technology. The target completion date is March 2006. ♦

Denis Gaudet graduated from the University of Alberta with a Mechanical Engineering Degree in 1973. Denis's oil and gas industry career began in Fort St. John, B.C. and continued in northern Alberta, B.C., The Netherlands, Scotland, Norway and England. While at Nowsco Well Service's head office in England, Denis worked throughout Europe and North Africa in sales, marketing and operations.

Denis returned to Calgary with Nowsco in 1986 to work in sales, operations, and international marketing, then moved to Canadian Fracmaster as Vice President of Technical Services.

Denis joined PTAC as a Board Member and represented oil and gas industry service sector companies for seven years. In his current position as Director, Technology Transfer, Denis is responsible for the Technology for Emission Reduction and Eco-Efficiency project and several technical areas within PTAC.



PTTC Tech Info

Solutions from the Field:

Online Technologies to Solve Problems Faced by Independent Producers

Summaries of PTTC region- sponsored workshops. For summaries of more than 100 workshops (of more than 1,000 conducted) and for a listing of the workshops held, logon to: www.pttc.org or for more details, contact 1-888-THE-PTTC, e-mail: hq@pttc.org. For some of the workshops the regions have posted speaker presentations online.

Unconventional Gas Resources in Kansas — Based on a workshop sponsored by PTTC's North Midcontinent Region, January 19, 2005, Wichita, KS.

Basic Carbonate Geology: One Day Short Course for Geologists and Engineers — Based on a workshop sponsored by PTTC's Appalachian Region and the Pittsburgh Association of Petroleum Geologists, March 8, 2005, Washington, PA.

Cost Effective Horizontal Well Technology — Based on a workshop sponsored by PTTC's Central Gulf Region, May 12, 2005, Lafayette, LA.

PTTC Participants Receive AAPG Awards

- ◆ **Honorary Membership:** Eddie David, David Petroleum Corp., AAPG Representative on PTTC National Board
- ◆ **Distinguished Service Award:** Scott Tinker, Bureau of Economic Geology, UT Austin; PTTC Texas Regional Director
- ◆ **House of Delegates Long Service Award:** William Harrison III, Western Michigan University, PTTC Michigan Satellite

American Oil and Gas Reporter Tech Connection Column

June

TORP Conference Features Ideas At Work In Kansas Fields

May

Opportunity Exists in Michigan's Mature Antrim Black Shale

April

Operators Share Their Secrets To Keeping Wells Unloaded

2nd Quarter 2005 Case Studies Petroleum Technology Digest

Solid expandable casing liner salvages inland water completion (June)

MPD well taps light oil in deep Monterey Shale (May)

Permian basin operators refine horizontal drilling techniques (April)

Petroleum Technology Digest is a joint project of Gulf Publishing (*World Oil*) and PTTC. See case studies online at www.pttc.org/case_studies/case_studies.htm. Contact lcoble@pttc.org.

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Alerts Via E-Mail: Another PTTC Service

	PTTC Highlight	Industry Highlight	DOE Highlight
June 17	California Rebate Program to Reduce Wasteful Energy Consumption...	PetroCube Well Load Module Speeds Average Reserve Calculation	Varied Technologies Reported in Latest <i>GasTIPS</i>
May 26	Highlights from Recent Regional Newsletters	Swellable Packer, A Completion Alternative	Heavy Oil Potential in Alaska
May 5	Key Sources of Alaskan Oil and Gas Data	Hart's E&P Announces 2005 Meritorious Engineering Innovation Awards	6 Basin-Oriented CO ₂ EOR Assessments by ARI
Apr. 15	Nurturing Tomorrow's Professions—Student Training/Internships	Escape™ External Perforating Process	2005 Stripper Well Consortium Projects

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Permian Basin
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PTTC's low-cost regional workshops connect independent oil and gas producers with information about various upstream solutions. For information on the following events, that are sponsored or co-sponsored by PTTC, call the direct contact listed below or 1-888-THE-PTTC. Information also is available at www.pttc.org/events.htm. Please note that some topics, dates, and locations listed are subject to change.

July 2005

- 7/27 South Midcontinent: *Horizontal Drilling with Case Studies in Osage County* - Norman, OK. Contact: 405-325-3031
- 7/28 West Coast: *Computer-Aided Geological and Petroleum Engineering Studies* - Valencia, CA. Contact: 213-740-7982

August 2005

- 8/16 Appalachian: *Well Testing, Theory and Practice* - Morgantown, WV. Contact: 304-293-2867 ext. 5446
- 8/17-18 West Coast workshop and field trip: *Petroleum Potential of Deep Horizons in California* - Valencia, CA. Contact: 213-740-8076
- 8/29 Rocky Mountain: *Gas in Low Permeability Reservoirs (RMAG)* - Denver, CO. Contact: 303-273-3107
- 8/TBD South Midcontinent: *SPCC Regulations, New Downhole Pumping Technologies* - Smackover, AR. Contact: 405-325-3031

September 2005

- 9/7 Eastern Gulf: *An Integrated Coalbed Methane Exploration Model: Defining Coalbed Methane Exploration Sweetspots* (AAPG DPA, MS Board of Registered Professional Geologists) - Jackson, MS. Contact: 205-348-1880
- 9/17-18 Appalachian: *Well Log Analysis* (AAPG Eastern Section) - Morgantown, WV. Contact: 304-293-2867 ext 5446
- 9/21 Appalachian: *From Rocks to Models, 3D Reservoir Characterization & Modeling* - Morgantown, WV. Contact: 304-293-2867 ext 5446
- 9/22 Texas/Central Gulf: *Improving Directional Drilling Performance* (Slider LLC) - Houston, TX. Contact: 512-471-0320
- 9/24 Rocky Mountain: (1) *Mining the Internet—Free GIS Data & Low Cost Software*, (2) *Bakken Play Essentials* (AAPG RMS Short Courses) - Jackson Hole, WY. Contact: 303-273-3107
- 9/TBD Midwest: *Pumpers Workshop* (Illinois O&G Assn.) - Salem, IL. Contact: 217-244-9337
- 9/TBD West Coast: *Troubleshooter Forum* - Los Angeles, CA. Contact: 213-740-8076

October 2005

- 10/20 Midwest: *U.S. Geological Survey Basin Assessment of Remaining O&G Reserves in the Michigan Basin* (Michigan O&G Association, U.S. Geological Survey) - Mt. Pleasant, MI. Contact: 269-387-8633

FUTURES IN ENERGY



Rod Hayes, instructor at the Futures in Energy class at the Colorado School of Mines, pointing out features in sandstones in the Red Rocks area, west of Denver



Laura Wray, petroleum geologist, discussing the oil-stained Dakota sandstone at the Turkey Creek water gap in a road-cut west of Denver.

Futures in Energy is an oil and gas industry outreach program organized by PTTC's Rocky Mountain Region. It provides talented high school juniors and seniors, and motivated high school teachers with scholarships to an oil and gas technology training program. The five-day interactive training program focuses on E&P technology and includes field trips. Subsequent student internships in industry provide students a real feel for the petroleum industry.

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