Week of Oct. 19, 2009/US$10.00

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# OIL&GAS JOURNAL®

International Petroleum News and Technology / www.ogjonline.com


## Offshore Rig Inspections

Papua New Guinea explorers eye play in Coral Sea
New shale plays emerge, environmental issues arise
Tests gauge LED sensors for fuel-dye measurements
Europe studies variables of common CCS approach


Do more exploring collaborating
carbon capturing pushing the envelope team building
subsurface subsea subanywhere smiling geosteering
globe-trekking horizontal drilling ecothinking biking
technology leading project leading industry leading
groundbreaking digital mapping remote sensing
rock sampling rock climbing relaxing on the weekends
playing creative thinking stress reducing family bonding
mud logging well logging caring for our environment
life balancing parenting softball playing soccer playing
initiative grabbing challenging yourself here.

OIL&GAS JOURNAL

Oct. 19, 2009
Volume 107.39

## Offshore Rig Inspections




## Regular Features



## Cover

The US Department of the Interior's Minerals Management Service has an extensive, detailed inspection program to ensure the safety of offshore oil and gas operations along with industry's compliance of environmental regulations. A special report starting on p. 20 outlines how MMS inspectors visit drilling rigs and production platforms on both announced and unannounced inspections. The cover shows an MMS inspector aboard ExxonMobil Corp.'s Platform Hondo, 5.1 miles off Santa Barbara County, Calif. This photo appeared in MMS Ocean Science, Vol. 5 Issue 1, and is reprinted with permission of the MMS.


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## General Interest



## Exploration & Development



## Drilling & Production



## Processing



## Transportation



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OGJ Newsletter

Oct. 19, 2009

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## General Interest — *Quick Takes*

### Iraq signs oil security pact with Britain

Iraq's parliament signed an agreement allowing as many as 100 British Royal Navy Trainers to return for up to a year to help Iraq protect its vital southern oil export terminals.

"The parliament passed the Iraqi-British security pact," said Abbas al-Bayati, a member of parliament's security and defense committee. Without explanation, he said a bloc of politicians withdrew from the vote.

The British security pact failed to pass during parliamentary sessions in July because of opposition from some politicians, particularly those loyal to Shia cleric Moqtada al-Sadr, who reject any foreign troop presence in Iraq.

In August, Iraq's South Oil Co. let a project management contract to AOC Holdings subsidiary Japan Oil Engineering (JOE) for front-end engineering and design to restore and upgrade southern Iraq's Fao export oil terminal.

Under the contract valued at ¥3 billion, JOE and Yachiyo Engineering Co. will help South Oil Co. design pipelines to connect a land-based oil storage facility with two sea-based shipping terminals 50 km off Basra in the Persian Gulf (OGJ Online, Aug. 6, 2009).

Most of Iraq's 2 million b/d of oil exports are shipped through the two oil terminals off Basra, where Iraq also faces problems with oil smugglers, border disputes with Iran, and a host of other security issues.

### Chaparral Energy, United Refining to merge

Privately owned independent Chaparral Energy Inc., Oklahoma City, and publicly held United Refining Energy Corp., a special purpose acquisition company, agreed to merge in a deal valued by company officials at $1.8 billion.

The combination is expected to close by Dec. 11 and will retain the Chaparral name. Founded in 1988, Chaparral has a large inventory of low-risk exploitation prospects as well as near-term, high-potential drilling projects. Since 2003, management has increased the company's reserves and production by 21%/year. At the end of June, it had proved reserves of 146 million boe, 62% of which is oil. Production in this year's first half averaged 21,000 boe/d.

United Refining in New York was formed last December to acquire energy assets through merger, capital stock exchange, asset acquisition, stock purchase, reorganization, or similar combinations. At the end of September, it held $452 million in trust.

Chaparral has acquired and enhanced properties in its core areas of the Midcontinent and the Permian basin, as well as in the Gulf Coast, the Ark-La-Tex region, North Texas, and the Rocky Mountains. It has several enhanced oil recovery (EOR) projects under way using carbon dioxide injection and has identified other candidates with the potential for substantial reserve and production growth, said company officials.

John A. Catsimatidis, United Refining's chief executive and chairman, will become executive chairman of the combined company. Chaparral's senior management will remain in place, including cofounder Mark A. Fischer, chairman and chief executive; Joseph O. Evans, chief financial officer; and Robert W. Kelly II, senior vice-president and general counsel.

"Chaparral's management team has demonstrated the ability to find lucrative oil and gas properties at prices that have resulted in superior returns on investment," said Catsimatidis. The merger is subject to approval of United Refining shareholders.

Fischer said, "This merger will give Chaparral access to capital we need to exploit our large inventory of drilling and development opportunities and to significantly step up our EOR program." ✦

## Exploration & Development — *Quick Takes*

### ExxonMobil reportedly buying stake in Jubilee

ExxonMobil Corp. reportedly has agreed to buy a stake in Jubilee oil field off Ghana from privately owned Kosmos Energy LLC, several media organizations have said. The Financial Times reported that the pending transaction was worth $4 billion.

"ExxonMobil routinely evaluates potential development opportunities around the world. We do not comment on the details of commercial discussions or opportunities," Patrick McGinn, ExxonMobil spokesman for upstream media relations, told OGJ in an e-mail.

A sale would require approval from Ghana's government, legal experts have said. Tullow Oil PLC operates Jubilee and owns 34.7%. Kosmos owns 23.49%. Other partners include Anadarko Petroleum Corp. 23.49% and Ghana National Petroleum Corp. 13.75%.

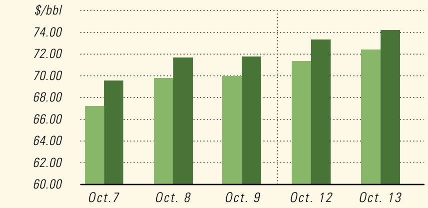
ExxonMobil already holds some of the largest acreages in West Africa including operations in Angola, Nigeria, Chad, Equatorial Guinea, and Niger. Ghana is part of an emerging play in northern West Africa. The play includes Sierra Leone (OGJ, Sept. 28, 2009, p. 36.)

Raymond James & Associates analysts said there do not appear to be any proved reserves associated with this deal, but the unbooked resource potential of Jubilee is estimated at 600-1,800 MMboe gross.

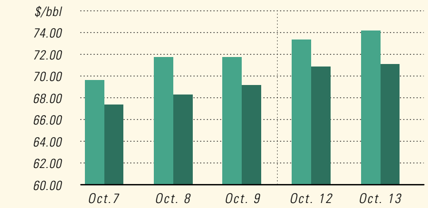
"This is Exxon's first entry into Ghana, and it has plenty of cash on hand to do so—$16 billion as of second-quarter 2009," RJA

# Industry Scoreboard

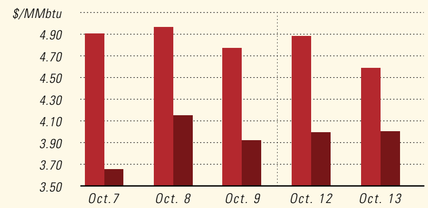
## IPE BRENT / NYMEX LIGHT SWEET CRUDE



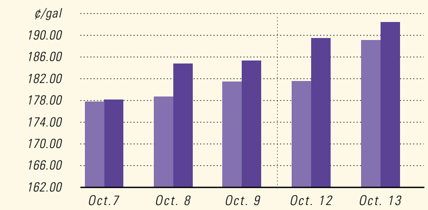

## WTI CUSHING / BRENT SPOT



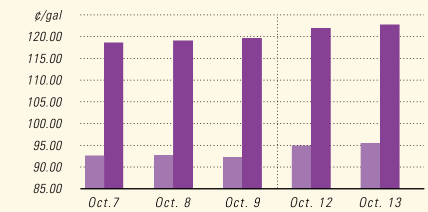

## NYMEX NATURAL GAS / SPOT GAS - HENRY HUB



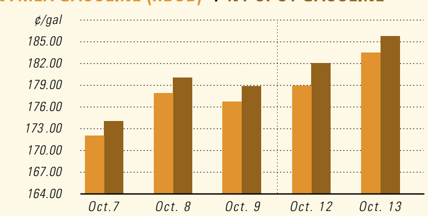

## IPE GAS OIL / NYMEX HEATING OIL




## PROPANE - MT. BELVIEU / BUTANE - MT. BELVIEU




## NYMEX GASOLINE (RBOB)[1] / NY SPOT GASOLINE[2]




[1]Reformulated gasoline blendstock for oxygen blending.
[2]Nonoxygenated regular unleaded.

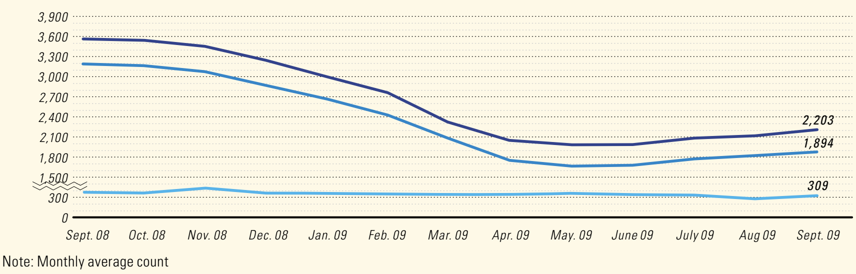
## US INDUSTRY SCOREBOARD — 10/19

| Latest week 10/2 | 4 wk. average | 4 wk. avg. year ago[1] | Change, % | YTD average[1] | YTD avg. year ago[1] | Change, % |
|---|---|---|---|---|---|---|
| *Demand, 1,000 b/d* | | | | | | |
| Motor gasoline | 9,047 | 8,516 | 6.2 | 9,025 | 9,002 | 0.3 |
| Distillate | 3,399 | 3,756 | –9.5 | 3,601 | 3,946 | –8.7 |
| Jet fuel | 1,427 | 1,476 | –3.3 | 1,414 | 1,579 | –10.4 |
| Residual | 409 | 523 | –21.8 | 541 | 621 | –12.9 |
| Other products | 4,524 | 3,635 | 24.5 | 4,188 | 4,417 | –5.2 |
| TOTAL DEMAND | 18,806 | 17,906 | 5.0 | 18,769 | 19,565 | –4.1 |
| *Supply, 1,000 b/d* | | | | | | |
| Crude production | 5,335 | 3,957 | 34.8 | 5,241 | 4,961 | 5.6 |
| NGL production[2] | 2,224 | 1,849 | 20.3 | 2,056 | 2,118 | –2.9 |
| Crude imports | 9,332 | 8,506 | 9.7 | 9,241 | 9,748 | –5.2 |
| Product imports | 2,634 | 3,115 | –15.4 | 2,789 | 3,148 | –11.4 |
| Other supply[3] | 1,684 | 1,622 | 3.8 | 1,685 | 1,551 | 8.6 |
| TOTAL SUPPLY | 21,209 | 19,049 | 11.3 | 21,012 | 21,526 | –2.4 |
| *Refining, 1,000 b/d* | | | | | | |
| Crude runs to stills | 14,512 | 12,540 | 15.7 | 14,512 | 14,683 | –1.2 |
| Input to crude stills | 14,871 | 13,275 | 12.0 | 14,871 | 15,038 | –1.1 |
| % utilization | 84.2 | 75.4 | — | 84.2 | 85.4 | — |

| Latest week 10/2 | Latest week | Previous week[1] | Change | Same week year ago[1] | Change | Change, % |
|---|---|---|---|---|---|---|
| *Stocks, 1,000 bbl* | | | | | | |
| Crude oil | 337,426 | 338,404 | –978 | 302,587 | 34,839 | 11.5 |
| Motor gasoline | 214,389 | 211,452 | 2,937 | 186,815 | 27,574 | 14.8 |
| Distillate | 171,756 | 171,077 | 679 | 122,601 | 49,155 | 40.1 |
| Jet fuel–kerosine | 45,733 | 45,983 | –250 | 36,783 | 8,950 | 24.3 |
| Residual | 35,269 | 33,969 | 1,300 | 37,809 | –2,540 | –6.7 |
| *Stock cover (days)[4]* | | | **Change, %** | | **Change, %** | |
| Crude | 22.9 | 22.8 | 0.4 | 23.6 | –3.0 | |
| Motor gasoline | 23.7 | 23.4 | 1.3 | 21.3 | 11.3 | |
| Distillate | 50.5 | 50.5 | 0.0 | 32.1 | 57.3 | |
| Propane | 70.3 | 72.9 | –3.6 | 79.7 | –11.8 | |
| *Futures prices[5]* **10/9** | | | **Change** | | **Change** | **%** |
| Light sweet crude ($/bbl) | 70.86 | 68.99 | 1.87 | 96.68 | –25.82 | –26.7 |
| Natural gas, $/MMbtu | 4.90 | 4.53 | 0.38 | 7.45 | –2.54 | –34.2 |

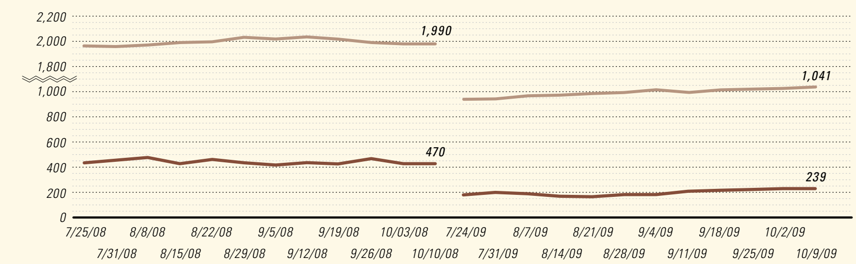
[1]Based on revised figures. [2]Includes adjustments for fuel ethanol and motor gasoline blending components. [3]Includes other hydrocarbons and alcohol, refinery processing gain, and unaccounted for crude oil. [4]Stocks divided by average daily product supplied for the prior 4 weeks. [5]Weekly average of daily closing futures prices.
Sources: Energy Information Administration, Wall Street Journal

## BAKER HUGHES INTERNATIONAL RIG COUNT: TOTAL WORLD / TOTAL ONSHORE / TOTAL OFFSHORE




Note: Monthly average count

## BAKER HUGHES RIG COUNT: US / CANADA




Note: End of week average count


Do you see a ladybug?
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said. "The major's move signals growing interest in the area and bodes well for future development."

Kosmos is led by James Musselman, formerly Triton Energy Ltd. chief executive officer. Triton discovered oil off Equatorial Guinea before Triton was sold in 2001 to Amerada Hess Corp., which is now Hess Corp.

### Newfield, Hess plan Marcellus joint venture

Newfield Exploration Co. and Hess Corp. plan to start drilling in 2010 on a joint exploration venture to exploit gas in Devonian Marcellus shale in northeastern Pennsylvania.

Newfield will operate the 50-50 venture, which covers as much as 140,000 gross acres in Susquehanna and Wayne counties.

Newfield noted it has gained shale gas experience in the Woodford shale in Oklahoma's Arkoma basin since 2003. It now has nearly 300 MMcfd of gas equivalent gross operated production capacity in 300 horizontal wells, and its 165,000 net acres are almost entirely held by production.

Hess has built unconventional oil expertise in the Williston basin Bakken oil play in North Dakota with horizontal wells and multistage fracturing. The two companies expect to finalize agreements in coming weeks for the Appalachian basin program.

### Total starts development on Timimoun project

Algeria's Sonatrach, Total SA, and Cepsa said the Algerian National Oil and Gas Development Agency has approved their development plan for the Timimoun natural gas project in Algeria.

According to Total, the approval is the outcome of an exploration and appraisal program begun in 2003, during which six wells were drilled.

Total said development work should begin in the fourth quarter, with gas production scheduled to start in 2013. Timimoun is expected to produce about 1.6 billion cu m/year of gas at its peak.

Operation of the Timimoun project will be jointly conducted by the stakeholders: Sonatrach 51%, Total 37.75%, and Cepsa 11.25%. The development plan entails drilling around 40 wells to tap eight structures over an area of 2,500 sq km.

The plan also includes construction of gas gathering and processing facilities, as well as a connection to the Sonatrach pipeline that will carry gas from fields in west-central Algeria to Hassi R'Mel.

### Eni adds to exploration acreage in Pakistan

In a joint venture with Pakistan Petroleum Ltd. (PPL) and Royal Dutch Shell PLC, Italy's Eni SPA, as operator, won an exploration license for onshore Sukhpur block in the Sindh province north of Karachi, Pakistan, near Eni-operated producing areas of Bhit and Badhra.

During a recent meeting in Rome with Pakistan President Asif Zardari, Eni Chief Executive Paolo Scaroni expressed his company's commitment to share its expertise and technology in the development of Pakistan's oil and sector under the Protocol of Co-operation signed last March with the Pakistani government.

Reuters news service quoted a Pakistani official as saying Eni is likely to double its investment in Pakistan to $3 billion as early as next year. However, Scaroni said future investments depend on new discoveries.

Eni also is exploring for gas and oil off Pakistan. Longer term, Scaroni said he's interested in transporting gas from Turkmenistan, Kazakhstan, and Iran—where Eni now operates—to markets in Pakistan, India, and China. He said Zardari supports Eni's ambition to initiate that project.

The Italian company has been in Pakistan since 2000 and was the first international company involved in exploration and production of gas with an equity production of 56,000 boe/d. It holds 15 exploration licenses (3 offshore and 12 onshore), and 7 production or development licenses (3 operated) in that country. ✦

## Drilling & Production — *Quick Takes*

### Kazakhs peg Khvalynskoye field at $5 billion

Development of Khvalynskoye natural gas field in Kazakhstan's sector of the Caspian Sea will cost $5 billion in the first phase, Kairgeldy Kabyldin, chief executive officer of state-owned KazMunaiGaz (KMG), told delegates at the Kazakhstan International Oil & Gas Exhibition & Conference.

Kabyldin's remarks follow a statement by Total SA that it signed a heads of agreement (HOA) establishing the principles of a partnership with KMG for development of Khvalynskoye.

Located in 25 m of water in the Caspian Sea on the border between Kazakhstan and Russia, Khvalynskoye is a conventional gas-condensate field to be developed by Russia's OAO Lukoil, operator. Gas from the field will go to Russia.

Total and GDF Suez Group will invest $1 billion in the project, which is expected to start producing as much as 9 billion cu m/year of gas in 2016.

The agreement, which boosts Total's role in the region, was signed in the presence of Kazakh President Nursultan Nazarbayev and French President Nicolas Sarkozy, who was on a visit to Kazakhstan (OGJ Online, Oct. 6, 2009).

Khvalynskoye is jointly owned with Lukoil, which said it had not concluded a production-sharing contract with KMG yet and would keep its 50% stake.

Meanwhile, under the terms of the HOA, Total and GDF Suez will acquire a participation of 25% (Total 17%, GDF Suez 8%) from the initial 50% stake held by KMG.

### Energy XXI to boost Main Pass 61 oil output

Three development wells, one of which found a new oil pay zone, are to be completed shortly in Main Pass 61 oil and gas field in the Gulf of Mexico off Louisiana, said Energy XXI (Bermuda) Ltd., Houston.

Energy XXI, field operator with 50% working interest, said an exploration tail for the CY-2 horizon at the MP 61 C-9 well cut 10 net ft of high quality oil below 8,000 ft true vertical depth, proving the existence and trapping of hydrocarbons below the main field pays. It plans to pursue the CY-2 and other deeper horizons with future drilling.

Logs at the C-9 well also indicate a greater-than-expected 122 net ft of oil pay in the BA-4AA1, BA-4AA2, BA-4AA2B, and J-6 sands at 7,145-7,810 ft TVD. TD is 9,000 ft TVD. The company plans to complete the J-6 sand in November. The other three sands represent proved reserve bookings and recompletion opportunities after J-6 depletes.

Logs at the A-11 well indicate 61 net ft of J-6 oil pay, also for completion in November. TD is 7,386 ft TVD.

Logs at the A-10 well indicate 45 net ft of hydrocarbon pay in J-6 in an updip attic area and with a gas-oil contact near the top of the sand. The company sidetracked A-10 away from the gas, drilled to 7,187 ft TVD, and found the J-6 full to base with 73 net ft of oil pay. It is to be completed by November.

Meanwhile, the South Timbalier Block 21 No. 128 well was reconditioned in the D-7 sand at 11,400 ft TVD and went on production Sept. 13 at a net 1,400 boe/d, 75% oil. Energy XXI is operator with 100% working interest, 83.3% net revenue interest.

The company recompleted the No. 75 well in the Rob E sand at 9,300 ft, and it came on line Oct. 6 at 700 boe/d net.

### Suncor plans work for Alberta oil sands plant

Suncor Energy Inc., Calgary, let a contract to KBR Canada to carry out turnaround services next year for its oil sands plant in Fort McMurray, Alta.

KBR Canada will provide turnaround planning, management, and execution for the shutdown and maintenance of the plant, including direct-hire labor resources and management of subcontractors.

Other services include planning, scheduling, change management, cost estimating, forecasting, and integrating KBR's work with Suncor and other turnaround participants.

Over the next decade, Suncor plans to double oil sands production from the plant to more than 500,000 b/d.

Last month Suncor Energy reported average oil sands production of 302,000 b/d. Year-to-date, oil sands production at the end of September averaged 295,000 b/d. "Production volumes were impacted by planned maintenance to a vacuum unit, which began on Sept. 8," the company said. ✦

## Processing — *Quick Takes*

### Qatar inaugurates Pearl GTL control room

Qatar Energy Minister Abdulla bin Hamad Al-Attiyah inaugurated the central control room at the massive 140,000 b/d Pearl gas-to-liquids (GTL) plant in Qatar.

The move signifies that commissioning of the project—which will produce liquid transport fuels and 120,000 boe/d of natural gas liquids and ethane—is imminent. This project is expected to position Qatar as the GTL capital of the world.

The central control room is a large hushed chamber, with four main banks of high-powered computers. It comprises almost 1,000 control cabinets hosting 179 servers that are programmed with 12 million lines of software code. The system is linked to every part of the plant by about 5,850 km of underground cables.

"While testing begins on the many thousands of pieces of equipment that have already been installed in the plant, construction continues and is expected to be complete around the end of 2010. Production ramp-up will then take around 12 months," said Pearl partner Royal Dutch Shell PLC.

Shell is buiding the plant in partnership with Qatar Petroleum. Peter Voser, Shell chief executive officer, hosted a senior Qatari delegation that also included Mohammed Saleh Al-Sada, minister of state for energy and industry affairs, Qatar Petroleum directors, and members of the Pearl GTL management committee.

Voser said, "Over 48,000 people are working on the Pearl GTL site—the largest single construction site in the oil and gas industry today. Much work remains to be done but we are on schedule to deliver."

The plant will process about 3 billion boe over its lifetime from the North field, which stretches from Qatar's coast out into the Gulf.

### Petrobras starts refining of first presalt crude

Brazil's Petroleo Brasileiro SA (Petrobras) began refining 264,000 bbl from Tupi field—its first load of oil from the presalt region—at the Henrique Lage refinery in Sao Jose dos Campos, Sao Paulo state.

Petrobras said Tupi's oil is rated as "paraphinic" and, according to the Bureau of Mines characterization factor, its specific gravity is 29.2° gravity, equivalent to a density of 0.877.

"This oil's sulfur level is low—the lower, the easier it is to meet future, increasingly strict specifications for all derivatives and particularly for naphtha and diesel," the Brazilian firm said.

Additionally, it said that oil coming from the Tupi Field has "low naphthenic acidity and good yield, as it does not generate fuel oil, the product with the least value added."

The Tupi reservoir lies more than 3,000 meters under the seabed, beneath 2,000 meters of salt, in 2,140-meter-deep waters 300-km off the São Paulo state coast.

According to Petrobras, recoverable volumes in the Tupi area are estimated at 5-8 billion bbl of "high-quality, light oil and natural gas." ✦

## Transportation — *Quick Takes*

### Shell's Australian FLNG timed for 2016 start-up

Royal Dutch Shell PLC does not expect to start production from its proposed floating LNG (FLNG) project in the Browse basin off Western Australia until at least 2016, according to the company's draft environmental impact statement.

Although the front-end engineering and design process (contracted to Technip SA of France and Samsung Heavy Industries of South Korea) has begun, Shell does not expect to make a final investment decision until early 2011.

The $5 billion, 600,000-tonne FLNG facility is expected to take 5 years to build.

Meanwhile, Shell intends to drill eight subsea production wells on its Prelude and Concerto gas discoveries in the Browse basin 475 km north-northeast of Broome. Development drilling is scheduled to begin in 2013 and take 2 years. The wells will be tied back to subsea manifolds before being connected to the FLNG vessel via flowlines and riser.

The vessel tow from the South Korea construction yard (Technip and Samsung also have the contract to build the FLNG), along with installation and hook up, will take about 6 months, with commissioning in late 2015 before first production the following year.

Production is estimated to comprise 3.6 million tonnes/year of LNG, 1.3 million tpy of condensate, and 400,000 tpy of LPG.

Shell says the offshore project will have a low environmental footprint on its location away from migration paths for whales and turtles that seasonally pass up and down the Western Australian coast.

The FLNG project will come on stream after the company's proposed onshore coal seam gas-LNG project at Gladstone, Queensland, in joint venture with Arrow Energy begins production in 2014.

### Toyo Engineering, Hitachi enter LNG business

Toyo Engineering Corp. and Hitachi Ltd. said they will join forces to make a full-fledged entry into the global market for LNG plants, according to media reports.

Japan's Nikkei Business Daily (NBD) reported that Hitachi will provide rotating equipment and power control software while Toyo Engineering will manage projects including plant design, equipment procurement, and construction.

US plant equipment manufacturer Chart Industries Inc. is also part of the tie-up, and will provide equipment for chilling and liquefying the gas, along with technologies to treat it.

NBD said the alliance will target small, undeveloped gas fields mainly in Australia and Indonesia, and will market relatively small plants that can produce as much as 2 million tonnes/year of LNG.

Australia and Indonesia hold an abundance of undeveloped small and midsize gas fields that would not be profitable if large plants were constructed for them, the paper said.

Many projects, which boast 5-10 million tpy capacity, cost hundreds of billions of yen and even more than ¥1 trillion to build.

The smaller plants the Toyo Engineering alliance is seeking to build cost 20% less to construct, including power generation equipment. They also take nearly a year less to build than the 4 years needed for most large plants.

The new group already has been commissioned by the Japan External Trade Organization to conduct a feasibility study on small and midsize gas fields in Papua New Guinea, NBD said.

### Dredging project to improve ops at Long Beach

The Port of Long Beach and the US Army Corps of Engineers announced a $40 million harbor-dredging project to improve navigation for oil tankers and other ships by removing and relocating nearly 1.5 million cu yards of sediment from the seafloor.

The dredging involves four separate locations. The primary focus is a turning basin south of the BP PLC oil terminal on Terminal Island (Pier T), which will be deepened to 76 ft, the same depth as the main channel. The deeper inner basin means large tankers no longer will need to unload part of their oil outside the breakwater to safely reach berth.

The new depth also allows ships to turn safely in the inner basin. Oil tankers must point toward the ocean when docked so that they can quickly move away from the berth in an emergency. The BP terminal is one of the busiest oil terminals on the West Coast.

Accumulated sediments at Catalina Ferry basin, near the mouth of the Los Angeles River, also will be dredged to improve the safety of the ferries between Long Beach and Catalina Island.

The project also includes the removal of contaminated sediments from the West basin, left over from past US Navy operations.

The dredge materials will be used to fill about 12 acres at the northern half of ITS Terminal in Pier G. The newly filled area will be incorporated into the terminal in early 2013 and help expand the use of on-dock rail.

The dredging, scheduled to begin in March 2010, is partially financed by federal stimulus funding. The projects will support 180 jobs for the next 2 years.

### Oiltanking Holding, TOPS reach settlement

Oiltanking Holding Americas has settled a lawsuit it filed earlier in 2009 against Enterprise Products Partners LP and Teppco O/S Port System LLC, its former partners in the proposed Texas Offshore Port System. Oiltanking filed suit in April following the withdrawal of the other two companies from the project.

Gus Spaepen, Oiltanking GMBH's managing director, confirmed settlement of the lawsuit, but would not disclose terms. Public filings by both Enterprise and Teppco report that each will record a $33.5 million expense connected to the settlement, slightly less than the $34 million non-cash charge the companies reported when they left the project (OGJ Online, Apr. 22, 2009). The settlement removes any legal impediment to moving the project forward.

In August 2008, affiliates of Enterprise, Teppco, and Oiltanking formed a joint venture to design, construct, own, and operate a new Texas offshore oil port and pipeline system for delivering waterborne crude to refining centers along the upper Texas Gulf Coast.

TOPS design includes an offshore port, two onshore storage facilities with about 5.1 million bbl of crude storage capacity, and an associated 160-mile, 1.8 million b/d pipeline. Total cost of the project was estimated at $1.8 billion. TOPS would use two single-point mooring buoys in about 115 ft of water capable of offloading 100,000 bbl/hr.

Long-term supply contracts with Motiva Enterprises LLC and an affiliate of ExxonMobil Corp. total about 725,000 b/d (OGJ Online Aug. 18, 2008). ✦

# Letters

## *Human impact statements*

Nick Snow's Watching Government column entitled "Delivering 'human impact statements'" hit a key issue that has been missing in policymaking in general and certainly in energy policy ever since We the People created government to make policy for us (OGJ, Sept. 28, 2009, p. 28). Policy at best pays lip service to the human element by suggesting that it will create jobs, but it seldom tells us how, or at what economic costs, or if other jobs will be lost (a component of economic cost).

Before we throw too much criticism at the administration, we should commend the fact that energy and the environment are being treated together. Indeed, both are interlocked, and it is about time that government recognized this fact.

Snow's column points out how critical it is to all policy, and especially the oil and gas industry, to bring the economy formally into the process.

The concept of a true economic impact statement that, by definition, must include the human impact component, has a much longer-term time horizon than what a politician sees. Indeed, economic costs are long-term, whereas political capital must be spent quickly while the "mandate" of election is still hot. Therefore, it should be of little surprise that such mundane issues as those affecting the Harrisons—the couple described in the column whose business was hurt by lease cancellations in Utah—would be shunted aside.

Similarly, a rush to get things done is why even the energy-environmental policy under consideration shows, at best, benign neglect of the 80% of our energy mix that will be around for a long time as policy hopes that we transition to the brave new world of clean and secure energy.

Of course such neglect could be justified as the 80% is assumed to be able to survive on its own. However, as the Harrisons found out, the devil is in the details and the consequences of a rush to make policy while ignoring economic and human impacts.

This column should be required reading for anyone inside the Washington, DC, beltway. Who knows? Some of them might even pay attention.

*John Tobin*
*The Energy Literacy Project*
*Evergreen, Colo.*

# Calendar

✦ Denotes new listing or a change in previously published information.

OIL&GAS JOURNAL online

Additional information on upcoming seminars and conferences is available through OGJ Online, Oil & Gas Journal's Internet-based electronic information source at http://www.ogjonline.com.

## 2009

## OCTOBER

SPE/EAGE Reservoir Characterization and Simulation Conference and Exhibition, Abu Dhabi, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 18-21.

GSA Annual Meeting, Portland, (303) 357-1000, (303) 357-1070 (fax), e-mail: meetings@geosociety.org, website: www.geosociety.org. 18-21.

Oil Shale Symposium, Golden, Colo., (303) 384-2235, e-mail: jboak@mines.edu, website: www.mines.edu/outreach/cont_ed/oilshale/. 19-23.

Oil and Gas Transportation in the CIS and Caspain Region Annual Meeting, Moscow, +44 (0) 20 7067 1800, +44 (0) 20 7242 2673 (fax), website: www.theenergyexchange.co.uk. 20-22.

SEG International Exposition and Annual Meeting, Houston, (918) 497-5500, (918) 497-5557 (fax), e-mail: register@seg.org, website: www.seg.org. 25-30.

SPE/IADC Middle East Drilling Conference & Exhibition, Manama, +971 4 390 3540, +971 4 366 4648 (fax), e-mail: spedal@spe.org, website: www.spe.org. 26-28.

PICT-Passive Inflow Control Technology Meeting, Copenhagen, +44 (0) 1483-598000, e-mail: Dawn.Dukes@otmnet.com, website: www.inflowcontrol.com. 27-28.

Louisiana Gulf Coast Oil Exposition (LAGCOE), Lafayette, (337) 235-4055, (337) 237-1030 (fax), e-mail: lynette@lagcoe.com, website: www.lagcoe.com. 27-29.

North African Oil and Gas Summit, Tunis, +44 (0) 20 7067 1800, +44 (0) 20 7242 2673 (fax), website: www.theenergyexchange.co.uk. 27-29.

Offshore Middle East Conference & Exhibition, Manama, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.offshoremiddleeast.com. 27-29.

✦Vietnam Saigon Oil and Gas Expo, Saigon, +49 40 30101 266, +49 40 30101 936 (fax), e-mail: industrial.pr@sgs.com. website: www.cpexhibition.com/vnoffshore. 29-31.

## NOVEMBER

Deep Offshore Technology International Conference & Exhibition, Monte Carlo, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.deepoffshoretechnology.com. 3-5.

IPAA Annual Meeting, New Orleans, (202) 857-4722, (202) 857-4799 (fax), website: www.ipaa.org. 4-6.

GPA North Texas Annual Meeting, Dallas, (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@gpaglobal.org, website: www.gpaglobal.org. 5.

Capture and Geological Storage of $CO_2$ Symposium, Paris, +33 1 47 52 67 21, +33 1 47 52 70 96 (fax), e-mail: patricia.fulgoni@ifp.fr, website: www.CO2symposium.com. 5-6.

Sulphur International Conference and Exhibition, Vancouver, +44 20 7903 2058, +44 20 7903 2172 (fax), e-mail: cruevents@crugroup.com, website: www.sulphurconference.com. 8-11.

Gas Turbine Users International (GTUI) Annual Conference, Calgary, Alta., +9714 804 7738, +9714 804 7764 (fax), e-mail: info@gtui.org, website: www.gtui.org. 8-13.

IADC Annual Meeting, Miami, (713) 292-1945, (713) 292-1946 (fax), e-mail: conferences@iadc.org, website: www.iadc.org. 9-10.

Multiphase User Roundtable-South America, Rio de Janeiro, (979) 268-8959, (979) 268-8718 (fax), e-mail: Heather@petroleumetc.com, website: www.mur-sa.org. 9-10.

API Fall Refining and Equipment Standards Meeting, Dallas, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 9-11.

Digital E&P Event, Houston, (646) 200-7444, (212) 885-2733 (fax), e-mail: cambrosio@wbresearch.com, website: www.digitaleandp.com. 9-11.

NPRA/API Operating Practices Symposium, Dallas, (202) 457-0480, (202) 457-0486 (fax), website: www.npra.org. 10.

Petroleum Association of Wyoming (PAW) Annual Oil & Gas Statewide Reclamation Conference, Casper, (307) 234-5333, (307) 266-2189 (fax), e-mail: cheryl@pawyo.org, website: www.pawyo.org. 10.

Deepwater Operations Conference & Exhibition, Galveston, Tex., (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.deepwateroperations.com. 10-12.

SPE International Oil and Gas China Conference & Exhibition, Beijing, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 10-12.

NPRA International Lubricants & Waxes Meeting, Houston, (202) 457-0480, (202) 457-0486 (fax), website: www.npra.org. 12-13.

ASME International Mechanical Engineering Congress and Exposition (IMECE), Lake Buena Vista, Fla., (973) 882-1170, (973) 882-1717 (fax), e-mail: infocentral@asme.org, website: www.asme.org. 13-19.

Latin America LPG Seminar, Miami, (713) 331-4000, (713) 236-8490 (fax), e-mail: ts@purvingertz.com, website: www.purvingertz.com. 16-19.

IADC Completions Conference, Houston, (713) 292-1945, (713) 292-1946 (fax), e-mail: conferences@iadc.org, website: www.iadc.org. 17.

Houston Energy Financial Forum, Houston, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.accessanalyst.net. 17-19.

IADC Well Control Asia Pacific Conference & Exhibition, Bangkok, (713) 292-1945, (713) 292-1946 (fax), e-mail: conferences@iadc.org, website: www.iadc.org. 18-19.

Energise Your Future Forum, Paris, +33 0 1 47 96 91 68, e-mail: claude.leonard@bostik.com, website: www.energiseyourfuture.com. 18-20.

## DECEMBER

Advanced Contract Risk Management Europe for Oil & Gas, Aberdeen, +44 0 207 368 9300, e-mail: enquire@iqpc.co.uk, website: www.contractriskmanagement.MAC=11579.003EDIARY. 1-2.

Refining and Petrochemicals in Russia and the CIS Countries Annual Meeting, Amsterdam, +44 (0) 20 7067 1800, +44 (0) 20 7242 2673 (fax), website: www.theenergyexchange.co.uk. 1-3.

World LNG Summit, Barcelona, +44 (0)20 7978 0000, +44 (0)20 7978 0099 (fax), e-mail: info@thecwcgroup.com, website: www.thecwcgroup.com. 1-4.

European Drilling Engineering Association Expandables, Multilaterals and Technologies Meeting, Vienna, +44 (0) 1483-598000, e-mail: Dukes@otmnet.com, website: www.dea-europe.com. 3-4.

International Petroleum Technology Conference (IPTC), Doha, +971 4 390 3540, e-mail: iptc@iptcnet.org, website: www.iptcnet.org/2009. 7-9.

Nuclear Power International Conference, Las Vegas, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.nuclearpowerinternational.com. 8.

Power-Gen International Conference, Las Vegas, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.power-gen.com. 8-10.

PIRA Natural Gas Markets Conference, New York, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 14-15.

PIRA Understanding Natural Gas and LNG Markets Seminar, New York, (212) 686-6808, (212) 686-6628 (fax), website: www.pira.com. 14-15.

PIRA Understanding Global Oil Markets Seminar, New York, (212) 686-6808, (212) 686-6628 (fax), website: www.pira.com. 16-17.

## 2010

## JANUARY

Plant Maintenance in the Middle East & Annual Meeting, Abu Dhabi, +44 (0) 1242 529 090, +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. 10-13.

Oil & Gas Maintenance Technology Conference & Exhibition Co-located with Pipeline Rehabilitation and Maintenance, Manama, Bahrain, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.oilandgasmaintenance.com. 18-20.

Pipeline Rehabilitation & Maintenance Co-located with Oil & Gas Maintenance Technology, Manama, Bahrain,

# Calendar

(918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.pipeline-rehab.com. 18-20.

*World Future Energy Summit*, Abu Dhabi, +971 2 4090 445, +971 2 444 3768 (fax), e-mail: ludoiva.sarram@reedexpo.ae, website: www.worldfutureenergysummit.com. 18-21.

*SPE Oil and Gas India Conference and Exhibition*, Mumbai, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 20-22.

*SPE Deep Gas Conference*, Manama, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 24-27.

*API Exploration and Production Winter Standards Meeting*, New Orleans, (202) 682-8000, (202) 682-8222, website: www.api.org. 25-29.

*Health, Safety, Environment & Training Conference & Exhibition*, Houston, (713) 292 1945, (713) 292 1946 (fax), e-mail: info@iadc.org, website: www.iadc.org. 26-27.

*The European Gas Conference and Annual Meeting*, Vienna, +44 (0) 20 7067 1800, +44 (0) 20 7242 2673 (fax), website: www.theenergyexchange.co.uk. 26-28.

*API/AGA Joint Committee on Oil and Gas Pipeline Welding Practices Conference*, New Orleans, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org. 27-29.

*Annual Gas Arabia Summit*, Abu Dhabi, +44 (0) 20 7067 1800, +44 (0) 20 7242 2673 (fax), website: www.theenergyexchange.co.uk. Jan. 31- Feb. 3.

*International Process Analytical Technology Forum (IFPAC)*, Baltimore, (847) 543-6800, (847) 548-1811 (fax), e-mail: info@ifpacnet.org, website: www.ifpac.com. Jan 31-Feb 4.

## FEBRUARY

*Deep Offshore Technology International Conference & Exhibition*, Houston, (713) 963-6271, (713) 963 6296 (fax), e-mail: registration@pennwell.com, website: www.dotinternational.net. 2-4.

*IADC/SPE Drilling Conference and Exhibition*, New Orleans, (713) 292 1945, (713) 292 1946 (fax), e-mail: info@.org, website: www.iadc.org. 2-4.

*Russia Offshore Annual Meeting*, Moscow, +44 (0) 20 7067 1800, +44 (0) 20 7242 2673 (fax), website: www.theenergyexchange.co.uk. 2-4.

*Global Petrochemicals Conference & Annual Meeting*, Vienna, Austria, +44 (0) 1242 529 090. +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. Feb 9-11.

*SPE International Symposium & Exhibition of Formation Damage Control*, Lafayette, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 10-12.

*NAPE Expo*, Houston, (817) 847-7701, (817) 847-7703 (fax), e-mail: info@napeexpo.com, website: www.napeonline.com. Feb 11-12.

*Annual Petroleum Coke Conference*, Seattle, (832) 351-7828, (832) 351-7887 (fax), e-mail: petcoke.conference@jacobs.com, website: www.petcokes.com. 12-13.

*SPE North Africa Technical Conference & Exhibition*, Cairo, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 14-17.

*IP Week*, London, +44 0 20 7467 7132, +44 0 20 7255 1472 (fax), e-mail: jbia@energyinst.org.uk, website: www.energyinst.org.uk. 15-18.

*Pipeline Pigging & Integrity Management Conference & Exhibition*, Houston, (713) 521-5929, (713) 521-9255 (fax), e-mail: clarion@clarion.org, website: www.clarion.org. 16-18.

*Pipe Line Contractors Association Annual Conference (PLCA)*, Scottsdale, Ariz. (214) 969-2700, e-mail: plca@plca.org, website: www.plca.org. 17-21.

*Laurance Reid Conditioning Conference*, Norman, Okla., (512) 970-5019, (512) 233-2877 (fax), e-mail: bettyk@ou.edu, website: www.lrgcc.org. 21-24.

*International Petrochemicals Technology Conference & Exhibition*, Madrid, +44 (0) 20 7357 8394, +44 (0) 20 7357 8395 (fax), e-mail: enquiries@europetro.com, website: www.europetro.com. 22-23.

*Photovoltaics World Conference & Exhibition*, Austin, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.Photovoltaicsworldevent.com. 23-25.

*Renewable Energy World North America Conference & Expo*, Austin, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.renewableenergyworld-events.com. 23-25.

*SPE Unconventional Gas Conference*, Pittsburgh, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 23-25.

*International Downstream Technology & Catalyst Conference & Exhibition*, Madrid, +44 (0) 20 7357 8394, +44 (0) 20 7357 8395 (fax), e-mail: enquiries@europetro.com, website: www.europetro.com. 24-25.

*SPE/IADC Managed Pressure Drilling & Underbalanced Operations Conference and Exhibition*, Kuala Lumpur, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 24-25.

*Nitrogen + Syngas International Conference and Exhibition*, Bahrain, +44 20 7903 2058, +44 20 7903 2172 (fax), e-mail: cruevents@crugroup.com, website: www.nitrogenandsyngas2010.com. Feb. 28-Mar. 3.

## MARCH

*APPEX Conference*, London, +44 0 20 74341399, +44 0 20 74341386 (fax) website: www.appexlondon.com. 2-4.

*Subsea Tieback Forum & Exhibition*, Galveston, Tex., (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.subseatiebackforum.com. 2-4.

*Middle East Geosciences Conference and Exhibition*, Manama, +973 17 550033, +973 17 553288 (fax), e-mail: fawzi@aeminfo.com.bh, website: www.geobahrain.org. 7-10.

*SPE Hydrocarbon Economics and Evaluation Symposium*, Dallas, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 8-9.

*Annual International LPG Seminar*, The Woodlands, Tex., (713) 331-4000, (713) 236-8490 (fax), website: www.purvingertz.com. 8-11.

*CERA Week*, Houston, (617) 866-5992, e-mail: info@cera.com, website: www.cera.com. 8-12.

*NPRA Security Conference & Exhibition*, The Woodlands, Tex., (202) 457-0480, (202) 457-0486 (fax), e-mail: info@npra.org, website: www.npradc.org. 9-10.

*Annual European Fuels Conference*, Paris, +44 (0) 1242 529 090. +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. 9-12.

*NACE International Corrosion Conference & Expo*, San Antonio, (281) 228-6200, (281) 228-6300 (fax), e-mail: firstservice@nace.org, website: www.nace.org. 14-18.

*International Pump Users Symposium*, Houston, (979) 845-7417, (979) 845-1835 (fax), e-mail: inquiry@turbo-lab.tamu.edu, website: http://turbolab.tamu.edu. 15-18.

*API Spring Committee on Petroleum Measurement Standards Meeting*, Dallas, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org. 15-18.

*Gas Asia*, Kuala Lumpur, +44 (0) 1242 529 090, +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk. 16-18.

*Oil and Gas Africa Exhibition & Conference*, Cape Town, SA, +27 21 713 3360, +27 21 713 3366 (fax), e-mail: events@fairconsultants.com, website: www.fairconsultants.com. 16-18.

*Offshore Asia Conference & Exhibition*, Kuala Lumpur, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.offshoreasiaevent.com. 16-18.

*Turkish International Oil & Gas Conference & Showcase (TUROGE)*, Ankara, Turkey, +44 (0) 207 596 5000, +44 (0) 207 596 5106 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.oilgas-events.com. 16-18.

*Electric Light & Power Executive Conference*, Tampa, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.elpconference.com. 21-22.

*NPRA Annual Meeting*, Phoenix, (202) 457-0480, (202) 457-0486 (fax), website: www.npra.org. 21-23.

*GPA Annual Convention*, Austin, Tex., (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@gpaglobal.org, website: www.GPAglobal.org. 21-24.

*AIChE Spring National Meeting & Global Congress on*

Process Safety, San Antonio, (203) 702-7660, (203) 775-5177 (fax), website: www.aiche.org. 21-25.

Howard Weil Energy Conference, New Orleans, (504) 582-2500, website: www.howardweil.com/energy-conference.aspx. 21-25.

Gas Turbine Users International (GTUI) Annual Conference, Calgary, Alta., +9714 804 7738, +9714 804 7764 (fax), e-mail: info@gtui.org, website: www.gtui.org. 21-26.

Middle East Downstream Week & Annual Meeting, Abu Dhabi, +44 (0) 1242 529 090. +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. 22-25.

IADC Drilling HSE Asia Pacific Conference & Exhibition, Singapore, (713) 292 1945, (713) 292 1946 (fax), e-mail: info@iadc.org, website: www.iadc.org. 23-24.

SPE/ICoTA Coiled Tubing & Well Intervention Conference & Exhibition, The Woodlands, Tex., (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 23-24.

Middle East Refining Conference & Annual Meeting, Abu Dhabi, +44 (0) 1242 529 090. +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. 23-24.

Base Oils and Lubricants in Russia and CIS & Annual Meeting, Moscow, +44 (0) 1242 529 090. +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. 23-25.

✦SPE Intelligent Energy Conference and Exhibition, Utrecht, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.intelligentenergyevent.com/conferenceOGJ. 23-25.

Utility Products Conference & Exposition, Tampa, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.utilityproductsexpo.com. 23-25.

DistribuTECH Conference & Exhibition, Tampa, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.distributech.com. 23-25.

Offshore West Africa Conference & Exhibition, Luanda, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.offshorewestafrica.com. 23-25.

Georgian International Oil, Gas, Energy and Infrastructure Conference & Showcase (GIOGIE), Tbilisi, +44 (0) 207 596 5000, +44 (0) 207 596 5106 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.oilgas-events.com. 24-25.

NPRA International Petrochemical Conference, San Antonio, (202) 457-0480, (202) 457-0486 (fax), website: www.npra.org. 28-30.

## APRIL

ATYRAU North Caspian Regional Oil, Gas and Infrastructure Exhibition, Atyrau, +44 (0) 207 596 5000, +44 (0) 207 596 5106 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.oilgas-events.com. 6-8.

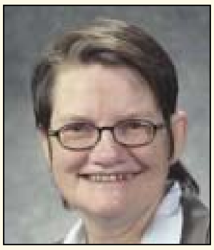
Rocky Mountain Unconventional Resources Conference & Exhibition, Denver, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.RMURconference.com. 6-8.

Oil & Gas WestAsia Exhibition in conjunction with SPE EOR Conference, Muscat, +968 24660124, +968 24660125 (fax), e-mail: omanexpo@omantel.net.om, website: www.ogwaexpo.com 11-13.

SPE EOR Conference at Oil & Gas West Asia, Muscat, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 11-13.

AAPG Annual Convention and Exhibition, New Orleans, (918) 560-2679, (918) 560-2684 (fax), e-mail: convene@aapg.org, website: www.aapg.org 11-14.

# Offshore care on line



Paula Dittrick
Senior Staff Writer

Technology continues to drive innovations in telemedicine—and consequently lower costs—for oil companies and drilling contractors responsible for providing medical care to offshore crews.

InPlace Medical Solutions enables offshore workers experiencing illness or injury to visit directly with physicians through real-time, two-way videoconferencing services. InPlace Medical Solution is a subsidiary of NuPhysicia LLC of Houston.

The idea is to reduce the number of unnecessary helicopter evacuations, which can be expensive. Fewer medical evacuations also increase productivity.

Scorpion Offshore Ltd. uses NuPhysicia's services aboard the jack up Offshore Courageous, which started a 3-year contract in January for Sarawak Shell Bhd./Sabah Shell Petroleum Co. Ltd.

Offshore Courageous is working alongside the Saint Joseph 607-B platform on Block 302 off Sarawak (east Malaysia). NuPhysicia has a 3-year contract with Offshore Courageous and soon plans to be on three more Scorpion rigs.

## Doctor on line

Typically, drilling rigs and platforms provide paramedics who consult with doctors via telephone. InPlace provides a video scope and a digital stethoscope for a medic to use on a patient while a doctor electronically monitors the examination.

The instruments use live video cameras that enable the doctor to see inside the patient's ear, nose, and throat, and listen to the patient's heart and lungs. The doctor also can view the skin via instruments providing lighting and magnification.

"Any rig with internet capability can have attention from board-certified physicians through telemedicine," said Shannon Caldwell, NuPhysicia's executive director of offshore and remote services. Patients are evacuated only if medically necessary.

Formerly, Caldwell was with Noble Drilling where he served as the corporate HSE advisor for eastern hemisphere operations covering three continents.

*Advanced equipment enables offshore patients and their medic to confer with an onshore doctor via medical-quality videoconference. Photo from telemedicine provider NuPhysicia LLC.*

During a pilot project with Offshore Courageous, InPlace Medical Solutions saw 27 cases where standard offshore protocols indicated evacuation events but only 4 evacuations resulted, marking an 85% reduction in evacuations and an estimated savings of $213,000, Caldwell said.

Evacuations were prevented because the doctor and patient agreed upon a method of care that could be provided onboard the Offshore Courageous.

## Pilot results

NuPhysicia provided OGJ with the statistic results of its 6-month Offshore Courageous pilot during which 100 visits were made to the clinic. Patients' confidential information was protected.

The patients' average age was 37. Upper respiratory infections accounted for 37% of the cases seen and were by far the most common reason for a visit to the clinic onboard the Offshore Courageous, Caldwell said.

The most common drugs prescribed were benadryl or levaquin, each of them accounting for 12% of the total patient visits. Ibuprofen was prescribed for 9% of the patients.

During January through March, physician-led health risk assessments were offered to the Offshore Courageous crew at no charge. Interest was moderate with 27 individuals completing a health questionnaire, getting lab results, and talking with a physician.

Many of the patients were medically obese or overweight, Caldwell said. Blood pressure measurement showed about one third of the patients had hypertension. As the average age of the oil employee increases, more workers have long-term medical problems such as hypertension and diabetes.

Consequently, companies are more willing to invest in preventive care and health maintenance.

Results of a patient survey indicated 69% of the crew reported visiting the medic and 54% saw a doctor via video telemedicine services. All participants said they were satisfied with the care and believed the video services improved the visit. ✦

Editorial

# Mitigating climate change

The International Energy Agency has performed a service with its detailed comparison of a business-as-usual energy projection with one that assumes a global effort to mitigate climate change. The comparison is part of the agency's World Energy Outlook to be published next month. IEA released the section on climate change early as an excerpt entitled "How the energy sector can deliver on a climate agreement in Copenhagen," where international leaders will meet in December.

Some of IEA's analysis is questionable. And the agency makes no pretense of neutrality on core political questions. But its report is rigorous and illuminating. It deserves attention.

## Political stance

IEA declares its political stance in the excerpt's first sentence: "Past editions of the IEA's World Energy Outlook (WEO) have highlighted the unsustainability of current energy trends—environmentally, economically, and socially—and the urgent need for action to bring about a wholesale global shift to low-carbon technologies." With this sentence, IEA brushes aside legitimate questions about climate-change remedies. At least it makes its prejudices clear.

The study's reference scenario includes projections that account for the economic slowdown and governmental policies adopted by mid-2009 on greenhouse-gas emission abatement. It assumes no implementation of policies merely under consideration or targets being discussed but not adopted as policy.

The mitigation scenario assumes globally coordinated enactment of policies that stabilize the atmospheric concentration of all greenhouse gases at 450 ppm carbon dioxide-equivalent by 2050. In the reference scenario, the concentration reaches 1,000 ppm. IEA asserts the lower concentration would result in a global temperature increase of 2° C. from an unspecified baseline.

Illumination comes from IEA's projections of investments related to the mitigation scenario. The agency assumes implementation of a range of remedies, including cap-and-trade systems, in industrialized countries and rapidly growing countries. The latter group includes Brazil, China, the Middle East, Russia, and South Africa. Other countries are assumed to seek climate-change remediation as well—but not via cap-and-trade.

IEA says measures implemented under the mitigation scenario would increase cumulative energy-related investment during 2010-30 by $10.5 trillion. Of that, $4.7 trillion would be for transport, $2.5 trillion for buildings, $1.7 trillion for electric power, and $1.1 trillion for industry, mainly for processing efficiencies and electric motors.

Of course, $10.5 trillion is a lot of money. If the investment occurred in equivalent annual amounts, however, each chunk would represent only 0.8% of global gross domestic product in 2007. That might seem like a minor diversion of capital. In fact, however, the capital shift would have economic consequences.

Investments required by governments are not the same as investments undertaken for purely economic reasons. If mitigation investments promised competitive returns at equivalent levels of risk, governments wouldn't need to evoke them by policy. Money invested to satisfy climate-change mitigation requirements is in fact money not invested elsewhere in pursuit of superior returns. Yes, mitigation investments would yield something. But it's easy to overstate the returns before the fact. At one point in its analysis, for example, IEA asserts that energy-cost savings would recoup the $8.3 trillion in extra investment over 20 years in buildings, industry, and transport. Without government coercion, what investors would risk so much capital on that proposition?

## Substantial cost

It's unreasonable to expect the payoff on mitigation investments to be anywhere near what returns would be on the same money invested in commercial alternatives. The difference is cost. And the cost of diverted investment would amplify costs of the elevation in energy prices integral to any meaningful effort to reduce greenhouse-gas emissions. So the overall cost of mitigation would be substantial. It would hurt economies.

Yet IEA sees no difference in global economic growth between the reference and mitigation scenarios in either 2020 or 2030. It apparently believes the costs of capital dislocation and higher fossil-energy prices can be totally offset by reductions in energy use and activity increases related to alternatives. Because the economic effects of error in policies adopted under this belief might be dire, not everyone will wish to make the same leap of faith. ✦

# Offshore rig, platform inspections protect personnel, environment

Paula Dittrick
Senior Staff Writer

US Minerals Management Service inspectors conduct field inspections of offshore drilling rigs and production platforms 7 days a week in the Gulf of Mexico, off California, and off Alaska.

The Gulf of Mexico MMS region is responsible for the most inspections. In the gulf, 55 inspectors go offshore every day using 14 leased helicopters.

The Outer Continental Shelf Lands Act charges the MMS with the responsibility of ensuring all oil and gas companies conduct offshore operations in a safe and pollution-free manner.

One of the first things an inspector notices is the housekeeping, Mike Saucier, MMS regional supervisor of field operations for the Gulf of Mexico, told OGJ in a telephone interview from his New Orleans office.


"It's amazing, but housekeeping is a key indicator," Saucier said. "If everything is neat and orderly, then the rest of the inspection usually goes really well."

Inspectors report that another key indicator is the level of supervision that oil companies provide their employees. Top performing companies tend to provide a lot of personnel oversight and training, he said.

Saucier notes that the hurricanes of past years did not make any difference in MMS inspection procedures.

"As we see different trends that occur in the gulf, maybe due to pollution issues, maybe due to safety issues, the regulations can be revised," Saucier said. "As far as issues that would require regulatory revision, we don't see anything at this point."

## Crane inspections

Recently, a special MMS task force conducted numerous inspections of offshore cranes because of an increasing number of lifting incidents involving primarily cargo but also some personnel lifting accidents.

"It looked like the incident of crane accidents were up so we did a blitz inspection, and the results came out pretty favorable. I don't see that we are going to revise any regulations," Saucier said. "Of course, we are going to keep looking at the cranes as we always do." Crane inspections are part of the annual inspection process.

MMS statistics show a total of 2,724 safety incidents reported during 2005-08 on the OCS, of which 506 incidents involved lifting operations. These statistics were outlined in Houston during an Offshore Safe Lifting Conference sponsored by the American Petroleum Institute in June (OGJ, Aug. 10, 2009, p. 33).

Joe Levine, senior engineer with the MMS office in Herndon, Va., reviewed statistics based upon reports that industry makes to MMS. Out of 506 lifting-related accidents, 351 happened during production operations and 155 happened during drilling operations.

*ExxonMobil Corp.'s Hoover Diana platform won the 2008 MMS Gulf of Mexico Region's Lake Jackson District Safety Award for Excellent in the high-production category. Photo from ExxonMobil.*

During 2005-08, four fatalities resulted from lifting operations of which two involved cranes and two involved other lifting devices such as hoists, tuggers, winches, or come-a-longs.

Of the 506 lifting incidents, two-thirds involved operations in less than 1,000 ft of water. Levine also noted that one-third of the incidents happened on 2% of the infrastructure.

## Timing of inspections

Under the OCS Lands Act authorization, MMS conducts at least one annual announced inspection for each of the 3,700 production platforms in the gulf.

"At any point, we can drop by unannounced," Saucier said. "We can be flying offshore, and if we think we need to stop at a particular facility, we can do that."

Although the drilling rig number varies daily, Saucier reported 81 drilling rigs were in the gulf in late September. Each drilling rig is inspected at least once a month while it is drilling.

Drilling inspections are not announced in advance. A typical drilling inspection takes about 3 hr.

Production inspections vary depending upon the type of platform. Inspection of a single-well structure can be completed in 30 min while a major deepwater production platform can take 3-5 days. Depending upon the remoteness of the platform, an inspector may decide to stay on the platform rather than fly back and forth daily.

"We rotate inspectors between the drilling and production so that all inspectors can do any type of inspection," Saucier said.

The total number of MMS inspections in the gulf for 2008 was 24,895. Saucier said this number is so large because inspectors visiting a production platform will conduct several categories of inspections.

Among the major categories of inspections done last year, Saucier reported 665 drilling inspections, 3,458 production inspections, 342 workover



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and completion inspections, 4,468 pipeline inspections, and 6,941 royalty meter inspections.

MMS also inspects stockpiles of industry's equipment to contain and clean oil spills.

"Industry is doing a good job on maintaining the oil spill response equipment," Saucier said, adding MMS inspects skimming equipment and booms annually.

Operators must keep available all equipment listed in their oil spill response plan. They must keep the equipment operational ready and also keep records of any equipment maintenance.

"This equipment is located at various locations across the gulf from Panama City, Fla., all the way to Corpus Christi, Tex.," Saucier said. "From our inspection program and monitoring, we are very confident that the equipment is there ready to be used when needed."

Before the Sept. 11, 2001, terrorist attacks on the US, the US Coast Guard was responsible for platform and rig inspections involving safety equipment for personnel such as life jackets, life rings, life floats, and escape capsules.

Since the USCG has become more involved in homeland security, MMS has taken over inspections on bottom-supported fixed production platforms. If MMS inspectors see any issue with personnel safety equipment, then they report it to the USCG.

"We are out there anyway doing our annual inspections," Saucier said. "It adds a little more time, but we go ahead and do those inspections for Coast Guard."

## Operators' responsibilities

MMS inspectors meet with representatives of both an oil company and also the drilling contractor involved.

"When we do an inspection, anything that we find that may need correcting, it is the responsibility of the operator of the lease," Saucier said. "The operator is working with the drilling rig contractor, who is there also, so MMS really talks to both parties."

In about February 2010, MMS plans to schedule individual annual performance reviews with some of the 120 operators in the gulf. Generally, MMS meets with operators that are performing below the industry average and a few operators performing above the industry average.

"We'll go over their statistics for 2009," Saucier said. "We meet with the ones who could improve, and we meet with the ones doing very well. It helps us determine what is working and what is not."

In addition to the annual review, MMS meets with operators throughout the year and on a weekly basis. MMS might initiate such a meeting if an operator is having trouble with something related to inspections.

Operators also can initiate a meeting with the MMS if for example they want to discuss compliance or new technology that they would like to use, he said.

## Inspection process

For completion inspections, MMS inspectors use a four-step process:

- Review operator records to verify completion of all required operator-performed inspections, tests, and training since the last complete MMS inspection.
- Visually inspect all safety and pollution-prevention devices.
- Test or demonstrate the operation of critical safety and pollution-prevention devices to ensure proper installation and operation as well as to witness critical pressure and operational tests.
- Inspect for operational safety throughout the facility, looking for unsafe conditions, spills, leaks, and environmental effects.

Partial inspections also are done with inspectors reviewing randomly selected records and randomly selected devices.

Each year, MMS presents the Safety Award for Excellence (SAFE) Program to recognize companies going above and beyond inspection requirements on both district and national levels.

The 2009 National SAFE Award went to Devon Energy Production Co., primarily in recognition of what one regulator called an "almost unprecedented" period without a lost-time accident.

Devon has gone 5 years without an accident that caused an employee to lose work time. In addition, Devon had good drilling performance with no incidents of noncompliance out of 13 wells drilled.

Bud Danenberger, who heads the MMS Office of Regulatory Programs, said Devon had the best operator safety index number.

The safety index is a formula that measures compliance on numerous aspects of offshore drilling rig and production platform operations. The index measures accidents and inspection violations by their severity. In 2008, MMS inspected 1,012 safety components on 98 Devon complexes in the gulf.

Tony Vaughn, senior vice-president for Devon's Offshore Division, said the accident-free record demonstrates the company's commitment to safety.

"More important than the recognition itself, however, are the daily actions that led to this recognition," Vaughn said of the SAFE award. "Day in and day out, our employees and our contractors demonstrate their commitment not only to safety, but to regulatory compliance and environmental protection."

ExxonMobil Corp.'s Hoover-Diana platform received the 2008 Lake Jackson District SAFE in the high-production category and also was named a national finalist for the 2009 SAFE award in OCS high-activity category.

Gary Walz, ExxonMobil US production operations manager for the gulf, said operating safely—in an environmentally sound manner and in strict compliance with regulatory requirements—is a business fundamental.

"It's part of our commitment to

corporate citizenship wherever we're operating that we strive to implement our global safety and environmental programs, 'No One Gets Hurt' and 'Protect Tomorrow. Today.'"

ExxonMobil has internally audited management systems that guide its Operations Integrity Management System. Walz said this provides strong management processes and helps the company adhere to all applicable laws and regulations.

"Operation of facilities within established parameters and according to regulations is essential," Walz said. "Applicable laws, regulations, permits, and other governmental requirements are met, and the resulting operating requirements are documented and communicated to those affected. Compliance is periodically verified."

He noted this practice ensures a good working relationship with offshore regulators. ✦

# Recommendations offered for withdrawn Utah leases

**Nick Snow**
*Washington Editor*

The US Bureau of Land Management should lead development of a comprehensive interagency strategy to address energy leasing, development, and related air quality concerns for other Western states, an interdisciplinary team which reviewed 77 withdrawn Utah leases said in a special report.

It also recommended increased coordination and collaboration on oil and gas leasing and development at the federal and state levels, studying the use of interdisciplinary field reviews for all proposed lease sales, and improving interdisciplinary participation in identifying parcels to be offered.

"The report made some very important recommendations that are the foundation for change on how we develop our oil and gas resources on public lands," US Interior Secretary Ken Salazar said as he and other DOI officials released the report Oct. 8. "We will make sure that our public lands are being managed to protect our lands, resources, and wildlife. We also will support oil and gas development in the right places."

He ordered the leases, which Utah's BLM state office sold in a Dec. 19 auction, withdrawn on Feb. 4 after a federal district court issued a temporary restraining order on them on Jan. 16.

US Sen. Robert B. Bennett (R-Utah) protested the withdrawal on Mar. 18 by placing a hold on David Hayes's nomination to be deputy Interior secretary. Bennett removed the block on May 20 when Salazar agreed to have Hayes review the withdrawn leases once he was confirmed.

In that initial review on June 11, Hayes found flaws leading up to the December lease sale and recommended that BLM establish an interdisciplinary team to make site-specific decisions on whether to reoffer the parcels under the same conditions, reoffer them under different terms, or defer them from leasing. This team's efforts led to the report just released.

## *Tract recommendations*

Essentially, it said 17 of the withdrawn oil and gas leases should be reoffered promptly, eight should remain off-limits because of their critical resource values in other respects, and 52 should be deferred. The deferrals range from simply correcting associated leasing documents to waiting until conditions are right to assure the leases will be developed in an orderly and sensible manner, DOI officials told reporters at a press conference.

"The report helps clear off the cloud that has hung over these 77 parcels since they were first proposed and gets to the bottom of which should be leased and which, such as those near national parks, are simply not appropriate for development," said Salazar. "It also includes several important recommendations for leasing reforms, which we will carefully review as part of our effort to improve our oil and gas programs and deliver a fair return to the taxpayer."

Officials emphasized that the interdisciplinary team conducting the last review was able to be more thorough than the Utah BLM field office employees who prepared the resource management plans that formed the basis of decisions to offer the tracts at the December sale. "Often when BLM develops land use plans, we don't have the luxury of conducting an inventory of resources. The team, having the chance to do this, tried to consider what's most desirable for our public lands," BLM Deputy Director Mike Pool said.

"We observed in our initial report that there's simply a lack of guidance for BLM employees who are making decisions on tracts which have been nominated by companies. In Utah in particular, a large percentage of tracts were opened up with very little guidance," said Hayes. The new report, he added, "could provide a road map to where it makes the most sense for oil and gas leasing, providing clarity. We think this will help the domestic oil and gas industry going forward."

"This was very intensive, which is why it was a great laboratory for learning," Salazar said. "The team found that no one did anything wrong at BLM, but it also found that the system BLM used was incomplete. How we do that in other places will be one of the issues we'll be looking at: how to accomplish higher quality decision-making given we can't always do this kind of intensive study. We are moving quickly to come up with reforms in BLM with respect to leasing. I expect those within 30 days."

## Visited tracts

The team's leader, San Juan National Forest Supervisor Mark Stiles, said the group visited each of the 77 tracts or chose a good viewpoint from which to observe them, studied documents that Utah BLM employees used leading up to the lease sale as well as protests that were filed, and, during their visits, "looked the other direction from where the parcels were" at nearby national parks.

"Clearly, some areas were ready to go forward, including the dry desert areas near Cisco, Utah, as well as some red rock country near Moab," he said. "We also saw areas which should be deferred so we can consider wildlife and scenic concerns, as well as their proximity to Canyonlands National Park. In one case, a tract looked promising but the boundary of Arches National Park was visible on the horizon. Some clearly needed to be removed, such as one which was adjacent to Canyonlands National Park or on a cliff overlooking a popular Colorado River recreation area."

A primary conclusion, according to Stiles, was that BLM needs to take a much stronger role in deciding which lease parcels should be offered, starting with information that oil and gas producers provide in their expressions of interest and continuing with a harder look at leasing within the context of the acreage's other multiple uses.

He said the report conceded that reviews as thorough as the one conducted for this study aren't always possible, but added that they should be more thorough, possibly by offering fewer parcels so more field work can be done. It also recommends that BLM, the National Parks Service, Utah's state government, and others should work on shared landscape plans for areas near Arches and Canyonlands National Parks, he said. "It should recognize that the nearly 3 million visitors annually to the Moab area are there not just for the national parks, but also for the BLM experience," Stiles said.

"The report demonstrates there was a headlong rush for leasing in the prior administration, and it took short cuts that led to areas being leases which should not have been," said Salazar. "It demonstrates that when we are allowing American's ownership of these lands to be leased out for oil and gas development, we need to do it right. I believe it was not done right in the past. The controversy which arose around these 77 leases will give us a laboratory for learning."

## GOP reactions

Two Republican members of Utah's congressional delegation were dismayed. "This report proves what I've been saying all along: that the Utah BLM office followed the proper procedures for reviewing the proposed lease parcels that were sold last year," Utah Sen. Bennett said on Oct. 8. "This report illustrates that rules only matter to this administration when they produce certain results. They've substituted the rule of executive whim for the rule of law, creating another huge vacuum of uncertainty for future BLM leasing decisions."

"While I respect the authors of this report, their findings are insulting," added US Rep. Rob Bishop, who chairs the congressional Western Caucus. "If the policy of the Obama administration is to not develop America's energy resources, just come out and say it. Be honest. Be transparent. The one thing I ask is please don't hide behind misleading statements and arguments about a 'flawed process' or 'a rush to judgment' by BLM or state officials in Utah.

"I fail to see how a 9-day, on-the-ground review by a team of outsiders is better than the 7-year process of public hearings and real input that produced the comprehensive plan by professional BLM and state employees in Utah," he added.

Rep. Doc Hastings (R-Wash.), the House Natural Resources Committee's ranking minority member, also did not agree with the findings. "With unemployment near 10%, it's astounding that the Obama administration is once again blocking American energy production and the creation of high-wage jobs. After withdrawing 77 parcels of land from oil and gas production in February, the administration is now only allowing 22% of these areas to be developed. The vast majority of land remains locked up, even though it has already been through an extensive 7-year environmental review process."

Referring to Salazar's observation that the approach taken in the latest report constitutes "a new day…a new beginning on how we deal with our resources," Hastings said, "If this announcement is the administration's definition of a 'new day,' the future of American energy does not look bright. This decision reflects the administration's clear lack of commitment to job creation and all-of-the-above energy development."

## Industry responses

Oil and gas groups generally criticized Salazar's decision to follow the report's recommendations to defer re-offering 52 of the withdrawn leases and permanently remove 8 more from consideration.

"Today's announcement that Secretary Salazar is removing 60 federal leases from development is just another in a series of actions this administration has taken to delay or thwart oil and gas exploration in areas where its development has been designated and where lease sales have been carefully planned," American Petroleum Institute Pres. Jack N. Gerard said.

"This troubling trend means less revenue to federal, state, and local governments at a time when our nation is running a record deficit. It also means fewer jobs at a time our nation is headed toward 10% unemployment, and it means less domestic energy available when our economy recovers and demand rebounds," he continued.

DOI chose redundant analysis over development despite 7 years of environmental analysis leading up to last December's lease sale, the Independent

WATCHING GOVERNMENT

Nick Snow, Washington Editor

Blog at www.ogjonline.com

# IOGCC tackles two key issues

The Interstate Oil & Gas Compact Commission agreed with the US Department of Energy's Fossil Fuels Office on Oct. 2 to collaborate on natural gas supply and delivery and climate-change mitigation issues.

At its 2009 annual meeting Oct. 4-5 in Biloxi, Miss., IOGCC adopted two new resolutions related to that agreement. Resolution 106 supports continued environmentally responsible domestic shale gas development. Resolution 107 supports state regulation of all forms of carbon dioxide geological storage.

Both resolutions reiterate a point IOGCC and its members have made for months: State regulators are more qualified than their federal counterparts to develop and enforce rules for these emerging technologies.

It may be particularly true of shale gas. The resolution notes that domestic gas production's share of total US gas supplies is expected to increase from 84% in 2007 to 97% in 2030. "Gas from shale formations is expected to be the fastest-growing source…during the same time frame," it says.

## Concerns expressed

The resolution acknowledges concerns over potential shale gas impacts associated with hydraulic fracturing, infrastructure, development in urban areas, and other issues.

It also reiterates IOGCC's stance that its member states already have effective regulatory systems to protect water, air, soils, and other resources as well as public health and safety.

"IOGCC, while believing no further study is necessary, urges the [US Environmental Protection Agency] to provide for the states to participate as a partner should any new studies be undertaken on the impacts of hydraulic fracturing," the resolution says.

It also urges DOE to continue providing financial and technical support for IOGCC to maintain and enhance initiatives supporting safe and environmentally sound shale gas development.

## Carbon storage

The second new resolution involves carbon capture and storage, a crucial emerging technology in addressing global climate change. It says that IOGCC member states already are involved through legislative and rulemaking activities which would recognize that $CO_2$ injections for enhanced oil recovery could be converted to ultimate geologic storage.

It encourages states, in conjunction with federal initiatives, to adopt suitable regulatory frameworks so the oil and gas industry and financial markets will have a road map to develop CCS projects.

In an address at the meeting, Texas Gov. Rick Perry, who will succeed Oklahoma Gov. Brad Henry as IOGCC's chairman in 2010, emphasized the organization's obligation to be a major domestic energy conservation voice. "I believe that anyone discussing energy in our nation and world must begin by acknowledging the essential role that oil and gas have played throughout our history and the reality that they must continue as fundamental elements of our energy portfolio," Perry said. ✦

Petroleum Association of Mountain States declared. "IPAMS believes all 77 leases should be reinstated. The closest parcel to a national park is 4 miles away, but most were several tens of miles away and all were adjacent to existing natural gas fields or leases," noted IPAMS Government Affairs Director Kathleen Sgamma. "With this decision, our government is continuing to deny access to American energy that belongs to all Americans, and making it even more difficult to increase energy security and tackle climate change."

Environmental organizations reacted more favorably. "Instead of adhering to a 'multiple-use' mandate, which provides for a variety of uses, many of which can cause harm to the natural or cultural values that these special lands were designated to protect, the new guidance prioritizes the protection of natural and cultural resources on national monuments and other areas created by proclamations or acts of Congress, like national conservation areas," said Kevin Mack in an Oct. 8 blog posting at the Wilderness Society's web site. ✦

# API: US drilling up, but still below year ago

*Nick Snow*
*Washington Editor*

US oil and gas drilling activity rebounded somewhat from the previous 3-month period during 2009's third quarter but remained substantially lower than the comparable 2008 period, the American Petroleum Institute reported.

API said the estimated 8,856 wells completed during the quarter ended Sept. 30 were 10.2% more than the second quarter's total but 46% less than the number for 2008's third quarter. Activity remains at levels not seen since 2003-04, it added in its latest quarterly well completion report.

"The trend of declining well completions is a clear indication that oil and gas companies, which are facing declining earnings and threats of increased taxes, continued to carefully monitor their expenditures," said Hazem Arafa, director of API's statistics department.

The report said the estimated number of US exploration wells dropped 59% year-to-year to 327, while the number of development wells fell 46% to 7,430.

Natural gas remained the primary target, with an estimated 4,097 wells completed, 49% fewer than in 2008's third quarter and the decade's most severe quarterly decline for gas wells, it indicated. Oil well completions also were well below a year earlier, with the 3,600 estimated wells during the quarter down 44% year-to-year, API said.

It also reported total footage at an estimated 50,716,000 ft during the third quarter, 53% less than during the comparable 2008 period.

## Oil resurgence

The report reflected what one Wall Street analyst has noticed. "There's been a significant resurgence in oil well drilling, primarily in the Permian basin and the Bakken, but gas drilling has remained relatively flat," said Mark S. Urness, who follows drilling contractors and oilfield services for Calyon Securities (USA) Inc. in New York.

"People have decided to wait and see on gas," he told OGJ in a telephone interview. "Most of the increased investments have been in oil, and it's been primarily the small, private operators. Everyone's waiting for 2010. Things are looking better for then because many bigger independent producers have recapitalized, but right now activity is dominated by smaller operators drilling for oil. That makes sense since a $70/bbl price looks pretty attractive."

Frederick Lawrence, vice-president of economics and international affairs at the Independent Petroleum Association of America, said that the quarter-to-quarter improvement was "a nice little rebound, but any optimism has to be cautious."

Lawrence thought it was interesting that unconventional sources such as shales continue to increase their share of total domestic gas production. "If you look at the Baker Hughes rig count, the horizontal rig count is down less than the vertical rig count year-to-year. That emphasizes the role deep gas formations such as the Haynesville and other plays are playing as they become more popular with producers," he told OGJ on Oct. 13.

Declining earnings and political issues still inordinately affect the upstream part of the oil and gas industry, Lawrence said. "The combination of much lower commodity prices and reduced demand is occurring in tandem with political challenges that the industry is facing during this recession-rebound. We still need to be fairly modest in our near-term expectations based on what economists are saying about the macroeconomy and the return of demand," he said.

"Longer-term horizons may be probable at this point," Lawrence said, adding, "With these higher prices, more gas is going into the market than into storage, which is good during these shoulder months since we'll probably have record inventories going into this winter." ✦

# Half of Shell's production will be gas by 2012, CEO says

**Nick Snow**
*Washington Editor*

Oil and natural gas are indispensable in a growing world energy market, and Royal Dutch Shell PLC plans to make gas roughly half of its total production by 2012, its chief executive officer said on Oct. 8.

"This is not merely a shift in our portfolio. Increasing natural gas production and transportation by liquefying it and shipping the LNG to global markets means that more natural gas will be available to displace coal as the fuel for power plants," Peter Voser said in an address at the Woodrow Wilson International Center for Scholars.

"In the United States, new technology has opened up abundant gas resources contained in dense rock formations, increasing supplies dramatically," Voser said, adding, "So you can see why I'm sometimes tempted to say: Nothing beats natural gas."

Responding to questions following his talk, Voser said Shell will expand gas's share of its total production beyond 2012. Shell is negotiating to capture gas that currently is flared in southern Iraq and export it as LNG, he said. For Europe, he said, gas is a steady supply source in itself, adding, "It's the management of pipelines between countries that creates insecurities, which can be addressed by diversifying suppliers."

Shell also has expanded its North American gas portfolio substantially over the past 2 years and intends to develop those holdings, Voser said. Gas hydrates contain even more resource potential, he noted, adding, "I think we are underestimating the contribution gas can make in helping the United States address global warming."

## Motor fuels outlook

Shell's growing interest in gas does not mean that the company plans to surrender its position as the world's leading motor fuel supplier, according to Voser.

"Car drivers want easy access to affordable transport fuel that takes them a long distance. That's nothing new," he said. "What has changed is the growing desire for driving that is fun, useful, and environmentally acceptable. This trend of cleaner driving is likely to continue, including in the United States, with fuel efficiency standards getting ever tighter.”

Shell will need to move beyond simply serving its customers efficiently in its new role, he said. “We'll have to build and cater for a growing community of energy customers who want to feel good about the energy they use,” said Voser. “We can offer them fuel-saving transport fuels and lubricants, blend in sustainable biofuels, capture [carbon dioxide] at the point of production and store it underground, as we plan to do at Canada's oil sands.”

Shell also can help its retail customers reduce their motor fuel consumption through programs such as Fuel-Save, which the Shell chief executive officer said has helped motorists in different countries cut their consumption 10-20% simply by driving differently. “Our philosophy is that customers who save fuel spend less money. And happy customers tend to be loyal customers,” he maintained.

Shell also is looking into energy alternatives, Voser said. But he also observed that it takes about 25 years for each new source to simply gain 1% of the total market. “Biofuels are reaching that mark about now. Wind could do so sometime in the next decade, 25 years after the first big wind farms were built here in the United States and in Denmark,” he said.

“Over a billion new vehicles are expected to come on to the world's roads between now and 2050, more than doubling today's total. So there will be room and need for many different fuel types, including conventional fuels, biofuels and electricity,” Voser said.

## *'At the nexus'*

Addressing to his talk's theme, “The Energy Company of the Future,” Voser said companies like Shell “sit at the nexus of one the world's most difficult and exciting challenges: building a new energy system capable of meeting the energy needs of future generations at much reduced environmental cost.”

This comes amid the International Energy Agency's prediction that the world will need to invest $36 trillion in energy supplies through 2030, Voser said. Using International Monetary Fund calculations, that's more than 30 times the amount which governments have used so far to save their banks and revive their economies, he said.

*“…I'm sometimes tempted to say: Nothing beats natural gas.”*

***—Royal Duth Shell PLC CEO Peter Voser***

“Complex challenges rarely have simple solutions. Shell's response has been multifaceted,” he said. “We develop scenarios and share them with the outside world. We invest more in new energy projects than any other private company. We spend more on research and development than any of our competitors. We develop new businesses, including in renewable energy.”

Since Shell is a business, and not a government, it has to focus on its own skills and capabilities to make certain it is in the right place at the right time, Voser said. That alone isn't enough, he added: “When you're in the right place today, there's still the question: Will you be there tomorrow? This is the trillion-dollar question confronting all oil and gas companies.”

Voser said Shell, in various stages of its history, invested in energy market segments not normally associated with its core oil, gas, and chemical businesses. These have included solar, forestry, nuclear power, and coal mining, and Voser said Shell sold these interests because it found that others were better at those businesses. “That doesn't mean we have given up on trying new things. For instance, we're a technology leader in the biofuels space; we distribute more biofuels than any other company, and we work very hard to build sustainable supply chains,” he said.

## *Greater access*

This also would not be the first time the oil and gas industry has had to respond to the prospect of tighter supplies, Voser said. “In the aftermath of the oil crises of the 1970s, for instance, the industry gained greater access to the Gulf of Mexico, which today makes a vital contribution to America's supply security,” he said. The company also would like to bring more oil from Alaska's offshore, which it considers the most promising US hydrocarbons basin, to the Lower 48 states, “but we're facing legal opposition there,” he added.

“Shell has been a responsible operator in Alaska since the 1950s, on land and at sea,” said Voser. “We're confident that developing more of Alaska's resources would be a win-win-win situation for the state and local governments, the local communities, and the companies involved.”

Elsewhere, he said Shell is pioneering development of a floating LNG technology which would let it produce and liquefy gas at full sea off Australia's coast, reducing environmental impacts ashore and sparing the company the cost of piping the offshore gas to land over a great distance (OGJ Online, Oct. 8, 2009).

Improved oil recovery rates also will be increasingly significant, he predicted. “Right now, on average, oil and gas companies produce 35% of the original oil in reservoirs. The rest stays in the ground because it's uneconomical to produce,” Voser said. “If we could increase this by just 1% worldwide, it could yield some 20-30 billion bbl of additional oil, as much as the proven oil reserves of the USA."

For traditional multinational oil companies, the days of easy access to easy oil are gone, he declared. Governments of countries with abundant resources want their societies to benefit, and they want their national oil companies more heavily involved. The oil multinationals can offer the most advanced technology, a global reach with a huge market of consumers, and the willingness to invest in local talent, the Shell executive said.

## Role of partnerships

"Take Qatar, where we are investing billions of dollars in an LNG plant and the Pearl [gas-to-liquids] plant, which will turn natural gas into liquid transportation fuel and other products," he said. "We will operate and maintain a fleet of 25 of the world's largest LNG tankers, while developing capabilities within Qatar's own shipping company Nakilat. The aim is to phase out our own role and hand over the management of the fleet to Nakilat."

Partnerships with producing nations will become increasingly important because some energy exporting countries such as Egypt, Indonesia, and Mexico will soon become importers, he said. Growing worldwide interest in addressing global climate change also matters, Voser said, noting that the company hopes one result of the upcoming conference in Copenhagen will be tangible progress in developing a global carbon market.

That would include a US carbon cap-and-trade system, which Voser said is more effective than a direct carbon tax in setting a market price. "We need such a market as the most effective way of promoting low carbon technologies, in particular carbon capture and storage. A lot, not everything, will depend on how far the United States is prepared to push the agenda forward," he said.

"There is the perception that the oil and gas industry is 100% opposed to congressional efforts to enact climate legislation. While other companies can address their own positions, this is not the position of Shell," said Voser. He said that Shell, as a member of the US Climate Action Partnership, is actively involved in helping Congress enact a fair and effective cap-and-trade program. "We recognize the value of such action in spurring investment and positioning the United States as a leader in the coming international climate negotiation," he said.

Voser said that amid this transformation, it's still important for Shell as a corporation to think in an integrated way. He conceded that this is a growing challenge since its businesses range from producing oil from deep beneath the frozen waters off Siberia to refueling millions of cars and trucks daily and heating homes, businesses, and institutions. "Future customers will base their choices on more accurate information, which they will obtain more quickly, from around the world. Winning companies will be the ones that stay ahead of the rising aspirations of energy customers, through innovation, pushing the limits of what is possible," he maintained. ✦

# Pemex confirms review of work in Chicontepec region

**Eric Watkins**
*Oil Diplomacy Editor*

Responding to earlier media reports, Mexico's state-owned Petroleos Mexicanos (Pemex) confirmed it is reviewing performance in the Chicontepec oil region, but is not suspending work there.

"Chicontepec is Mexico's largest hydrocarbon reserve, so it's not a project that we can suddenly turn around and say, 'Hey, I'm not going to do it,'" said Pemex corporate finance director Esteban Levin Balcells.

Energy Minister Jordy Herrera echoed those remarks saying that while Mexico is concerned about oil production levels at Chicontepec, "rash decisions" should not be taken on drilling projects there.

The remarks by Herrera and Balcells followed earlier media reports citing Juan Carlos Zepeda, president of the Comision Nacional de Hidrocarburos (CNH), as saying, "The project should be halted until Pemex has a proper development plan."

Zepeda said CNH, which sets standards for Mexico's oil and gas fields, would renegotiate the issue of halting work with Pemex by yearend.

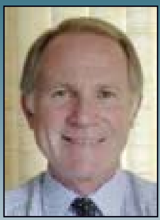
CNH was set up earlier this year under the 2008 sector reforms to oversee Mexico's oil and gas exploration and production and make recommendations to the state company.

Analyst IHS Global Insight suggested that the difference of opinion between CNH and Pemex came down to a test of strength between the two bodies.

"At the moment the commission's recommendations are not mandatory, which means that Pemex could indeed choose to reject a future call for it to suspend investments in Chicontepec, raising the prospect of the point of the new body existing at all being questioned just months after its creation," IHS Global Insight said.

Zepeda's comments follow earlier reports of mounting concerns among Mexican government officials that the Chicontepec reservoir is failing to deliver as much oil as expected, despite the large financial investment already made in the project.

Pemex is reported to have spent more than $3.4 billion on the Chicontepec project in a bid to increase its falling crude oil output but has failed to



# Turkmenistan cleans house

Turkmenistan's President Gurbanguly Berdimuhamedow recently met with officials to discuss his country's oil and gas industry. His verdict? Turkmenistan looks to the future with confidence and is already preparing for a post-crisis surge in global energy consumption.

"Even when there is crisis and consumption of oil and gas is declining, one should not listen to those who call for cuts in oil and gas extraction," he said, adding, "The crisis is developing by its own rules, and in the end, the recession will be replaced by a rise, when huge volumes of energy resources will be needed. The winners will be those countries which have been prepared for this surge."

The president also expressed confidence that the strategic program of development of the oil and gas industry until 2030 would be implemented. Under this document, by then, the country is expected to have raised extraction of gas to 250 billion cu m and oil to 100 million tonnes.

## Officials fired

The president's remarks came amid a crisis in his country's oil and gas industry, too. He fired nearly all the country's top oil and gas officials on Oct. 14, accusing them of waste and inefficiency in developing the nation's oil and gas resources.

"As a result of the irresponsible attitude toward their work shown by some industry leaders, our government has not received the expected result," Berdymukhamedov told government officials.

He reserved particularly sharp criticism for the decline in oil production and the failure to extend the gas network to several residential areas across the country.

"Instead of oil production going up, it is in constant decline," he said.

"Foreign companies that work in our country under the same conditions, but that use modern technology and equipment, operate twice as efficiently as (state oil company) Turkmenneft."

## Possible fraud

Dismissed in the industry shakeup were Mineral Resources Minister Annaguly Deryayev; head of state gas company Turkmengaz, Dovlet Mommayev; and state oil company Chairman Orazdurdy Khadzhimuradov.

Other reports detail the events leading up to their dismissal, saying that various officials had "grossly overestimated" the deposits of gas in the South Yolatan field, which Turkmen authorities had called "a super giant."

After close scrutiny, however, it surfaced that Turkmen auditors had overstated the field's gas deposits by at least three times, either by mistake or deliberately.

Such revelations could put a dent in the world's perception of Turkmenistan. It is very much to the credit of the Turkmen president for heading off what could have been an even greater embarrassment—fraud even—down the road.

The officials fired by Berdimuhamedow were expected to address investors at an oil and gas conference in the Turkmen capital, Ashgabat, next month.

Chalk one up for Turkmenistan's truthful president. ✦

achieve the initially targeted results.

In the process, Pemex has awarded contracts valued at several billions of dollars for work at Chicontepec to Schlumberger Ltd., Weatherford International Ltd., Halliburton Co., and a unit of Mexican billionaire Carlos Slim's industrial and retail conglomerate Grupo Carso SAB.

However, Mexico's hopes for Chicontepec have not yet been borne out as production stood at just 31,000 b/d in August, with reports saying that output there will likely end the year far below the early expectations of 70,000 b/d.

Chicontepec, which covers an area of 3,785 sq km in Veracruz and Puebla states, has total reserves estimated at 18 billion boe and embodies the hopes of the nation for improved output.

Pemex's overall crude production has fallen to less than 2.6 million b/d from a record 3.4 million b/d in 2004, largely due to the decline at Cantarell field.

Herrera, in charge of planning and technical development at the energy ministry, said the government sees the decline in output at Cantarell stabilizing, although it will never regain its peak levels of the past. ✦

# Southern Sudan OKs plan for 50,000-b/d refinery

*Eric Watkins*
*Oil Diplomacy Editor*

Even as it faces fresh conflict with its northern rival, the government of Southern Sudan approved plans to build a $2 billion refinery, according to a senior official of the semi-autonomous state.

Energy Minister John Luk said the southern government plans to build the 50,000-b/d refinery in Akon, Warap state, to serve all seven states west of the Nile.

Luk said construction will take 36 months, and the refinery will process crude from the fields of Unity state. An

Italian company is working on details of the facility, which will be open to tender soon.

Southern Sudan's state-owned Nilepet Corp. is to form a joint venture with the winner of the bid. The government plans another refinery for the Dar Blend oil fields in the Upper Nile region, Luk said.

The energy minister's statements coincided with reports the northern Sudanese government offered to help Uganda as it begins oil production in the Albertine rift stretching from Southern Sudan through the Lake Albert Valley to southwest Uganda.

"The Sudanese government is ready to cooperate with Uganda in developing its oil sector, including establishing a refinery," said Ali Hussein Award, Sudan's ambassador to Uganda. He said Khartoum also is ready to resolve outstanding border disputes with Uganda.

Meanwhile, fresh controversy over oil-revenue sharing between the northern and southern Sudanese governments erupted with publication of a report by Global Witness, an international nongovernmental organization, that shows a discrepancy between figures of the northern Sudanese government and those of Chinese National Petroleum Corp., operator.

According to the Global Witness study, the Khartoum-based northern government underreported production in certain block by as much as one quarter less than the amounts given in annual reports of CNPC, which operates the blocks.

According to the report, the southern government received $2.9 billion in oil revenues in 2009. The alleged discrepancies are of the order of 9-26%, so any money owed to the southern government by the Khartoum government could be large.

Key findings by Global Witness include:

- The volume of oil the Khartoum government reported produced in Blocks 1, 2, and 4 in 2007 was 9% less than stated in CNPC's annual report.
- The volume Khartoum reported produced in Blocks 3 and 7 in 2007 was 14% less than CNPC listed.
- The volume Khartoum and other sources reported produced in Blocks 1, 2, 4, and 6 in 2005 was 26% less than CNPC's figures.
- Khartoum's and CNPC's numbers were about the same only for the one oil block located entirely in the north and not subject to revenue-sharing.
- Oil prices published by the finance ministry in Khartoum and those published in the oil industry press for sales in the same months do not match.

"The problem is that the southern government cannot verify that the oil figures published by the Khartoum government are correct," said the report titled "Fuelling Mistrust: The need for transparency in Sudan's oil industry."

In 2005, a peace agreement ended Africa's longest-running civil war—the 22-year conflict between north and south Sudan. Under the agreement, revenues from southern oil wells are to be shared between the northern and southern governments.

Due to the current discrepancy over oil accounting, however, Global Witness said "a return to conflict looks all too likely" as armies are already massing on along the border.

During the civil war, 1.5 million people were killed and four out of every five people in the south had to flee their homes at some point, according to Global Witness. ✦

# Iraqi minister sees 'big leap' coming in oil production

*Eric Watkins*
*Oil Diplomacy Editor*

Following agreement on two new oil service contracts, Iraq's oil minister said he expects his country to increase its oil production to 10-12 million b/d over the next 6 years from the current 2.5 million b/d.

"What we expect from the first bid round and what we hope for from the second round is that Iraqi production will be between 10 to 12 million b/d, and this will make Iraq equal to the world's biggest oil producers," said Hussein al-Shahristani, referring to one auction in June and another due in early December.

Al-Shahristani's remarks, which made no reference to the need to adjust production quotas set by the Organization of Petroleum Exporting Countries, came as international oil companies agreed to Iraq's financial conditions for investment in two major oil fields, Zubair and West Qurna 1, in southern Iraq.

The minister said a consortium led by Italy's Eni SPA had agreed to Baghdad's offer of $2/bbl for each extra barrel of oil it extracts on top of the current production of 227,000 b/d at the 4.1 billion bbl Zubair field.

Al-Shahristani said he wanted oil production at the field to increase by 1.125 million b/d within 6 years' time.

Meanwhile, the minister said that two competing consortia—one led by ExxonMobil Corp. and the other by OAO Lukoil—had submitted bids that met Iraq's conditions for the 8.6 billion bbl West Qurna 1 field.

"After a major effort from the oil ministry, our price was accepted, which is $1.90 per additional barrel," said al-Shahristani, adding that ExxonMobil proposed an additional 2.1 million b/d, while Lukoil offered 1.5 million b/d for the field, which now produces 279,000 b/d.

Al-Shahristani said that within 2 weeks the agreement would be completed with the Eni-led consortium, which is comprised of Sinopec, Occidental Petroleum Corp., and Korea Gas Corp.

The oil minister said it would also take two weeks to decide between the offers of the ExxonMobil-Lukoil consortia. ExxonMobil's consortium includes Royal Dutch Shell PLC, while Lukoil is in partnership with Conoco-Phillips.

The two new agreements have improved the outlook for Iraq's oil and gas industry following the June auction when eight fields were offered to IOCs but only one of them, the 17.8 billion bbl Rumaila field, was awarded.

That field went to a consortium comprised of BP PLC and CNPC which bid $2/bbl produced to develop the Rumaila field with a production target of 2.85 million b/d, up from the current 1 million b/d.

The price demanded by all of the other IOCs in the June auction was at least twice as high—and in a few instances, almost 10 times higher—than what the oil ministry was willing to pay.

Combined with the BP-CNPC investment in Rumaila, al-Shahristani said the two new agreements mean that IOCs will invest $100 billion into his country's oil industry, with production set to increase by at least 6 billion b/d.

The minister did not detail the efforts that would be required to develop his country's industry so quickly, saying only that, "We do believe that it is a big leap in developing Iraqi oil fields." ✦

# Union claims IOC lobbyists pressuring Brazil legislators

*Eric Watkins*
*Oil Diplomacy Editor*

Brazil's largest union of oil workers, the Federacao Unica dos Petroleiros (FUP), claimed international oil companies are pressuring legislators to amend a bill that would extend special benefits to the country's state-run Petroleo Brazileiro SA (Petrobras).

"There's a very strong presence of [IOC] lobbyists in the Chamber of Deputies (lower house), represented by the Brazilian Petroleum Institute," said FUP general coordinator Joao Antonio de Moraes.

During an Oct. 8 hearing in the Brazilian Senate, de Moraes said a provision in a bill to ensure Petrobras has operatorship and a stake in each block of the presalt region is being "heavily attacked" by private oil companies.

De Moraes told legislators allowing IOCs to operate presalt projects would result in a loss of "exclusivity and control over the technology" needed to exploit the hard-to-reach deepwater deposits.

Brazilian President Luiz Inacio Lula da Silva's government recently submitted a legislative proposal to change the current concession regime to a production-sharing system that would guarantee Petrobras as sole operator of all presalt deposits and provide it a minimum 30% stake.

Under the proposed legislation, other companies could partner with Petrobras and hold majority stakes in the joint ventures. But Petrobras, as operator, would control key decisions regarding development (OGJ, Sept. 14, 2009, p. 27).

In its monthly report, the International Energy Agency noted discussion of the proposed new regulations continue in Brazil's legislature, and future bidding rounds depend on their approval.

Brazil's subsalt region is the most attractive new oil frontier in recent years among producers outside the Organization of Petroleum Exporting Countries, IEA's report said.

"New discoveries within Brazil's much-feted presalt (subsalt) deepwater offshore basin have come along recently with such regularity as to almost go unremarked," the agency said. However, IEA revised down its forecasts for total Brazilian supply this year by 25,000 b/d to 2.51 million b/d, and in 2010 by 45,000 b/d to 2.75 million b/d.

Meanwhile, Brazilian construction conglomerate Odebrecht Group secured a $1.5 billion loan for its two deepwater drilling vessels, Norbes VIII and Norbes IX. Odebrecht said it will invest a total $1.7 billion in the two vessels, which have 10-year drilling contracts with Petrobras and can drill in 3,000 m of water in the presalt regions.

In other news, Keppel Corp.'s offshore and marine unit Keppel FELS and its joint venture partner J. Ray McDermott signed a letter of intent with Petrobras and Chevron Corp. for an oil platform in Brazil. Keppel said the contract is expected to be signed "at a later date."

Keppel FELS and J. Ray McDermott formed the FloaTEC JV to bid for Petrobras's P-61 oil platform contract with an estimated value of $1.07 billion. ✦

# Papua New Guinea explorers eye deepwater play in Coral Sea

**Michael Swift**
**Peter Cockcroft**
*Blue Energy Ltd.*
*Brisbane*

**Jimmy Haumu**
*Papua New Guinea Department of Petroleum*
*Port Moresby*

Papua New Guinea has a well established oil and gas production region in the Highlands area of the country.

The commercial fields are largely restricted to a narrow fairway of Jurassic age clastic reservoirs in the Papuan basin. The deposits are mainly gas-condensate with some oil-only fields, and current known gas and liquids in place total 30.5 tcf and 1.247 billion bbl.

A second play, Miocene reefs in the western Papuan basin, is mostly biogenic gas, with limited geographic distribution; again, a narrow ribbon on a paleo-shelf break.

There is always a need to discover a new play to increase the prospectivity and hydrocarbon potential. Blue Energy Ltd. has done this and gone one step further in not only defining a new play type but also a large fairway in a new basin that is not explored. This article summarizes these exciting new concepts.

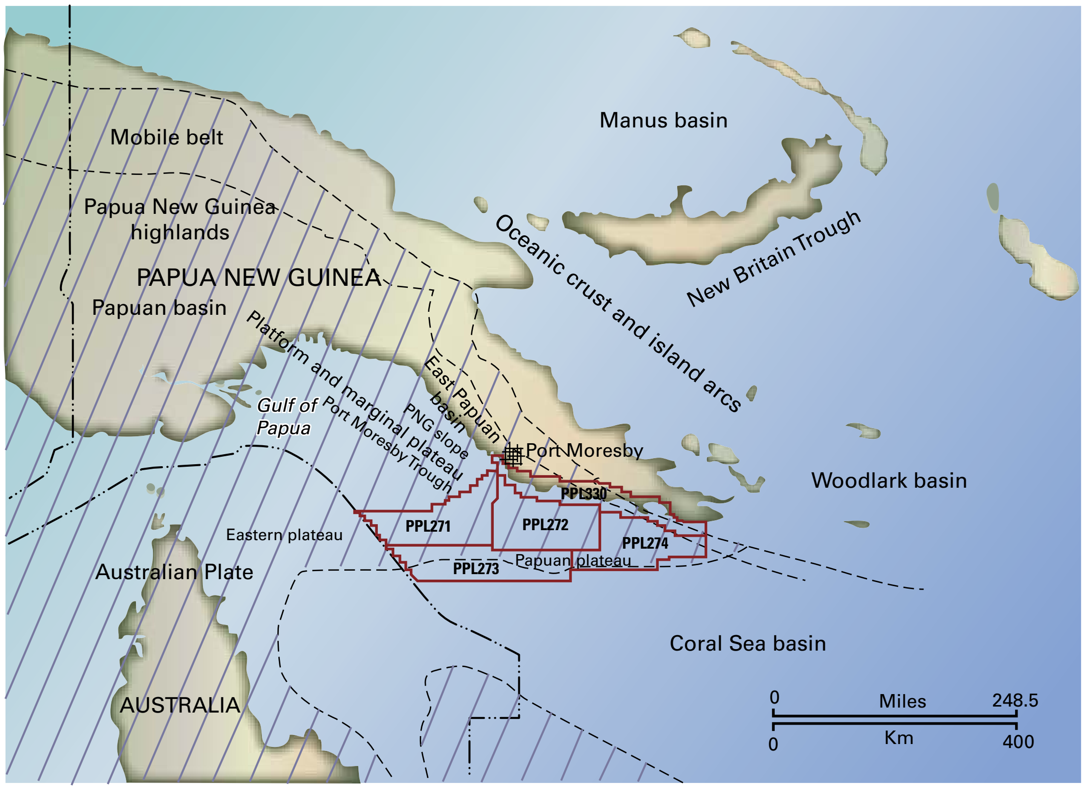
## Deepwater play

The regional geological setting is shown in Fig. 1. The permits held by Blue Energy are PPLs 271, 272, 273, 274, and 330. They span deepwater offshore to transition to land on the southern peninsula of Papua New Guinea.

The deep water, steep slope, and the proximity of oceanic crust, ophiolites, high-grade metamorphics, and the surface have previously been used to downgrade the prospectivity of the region to zero.

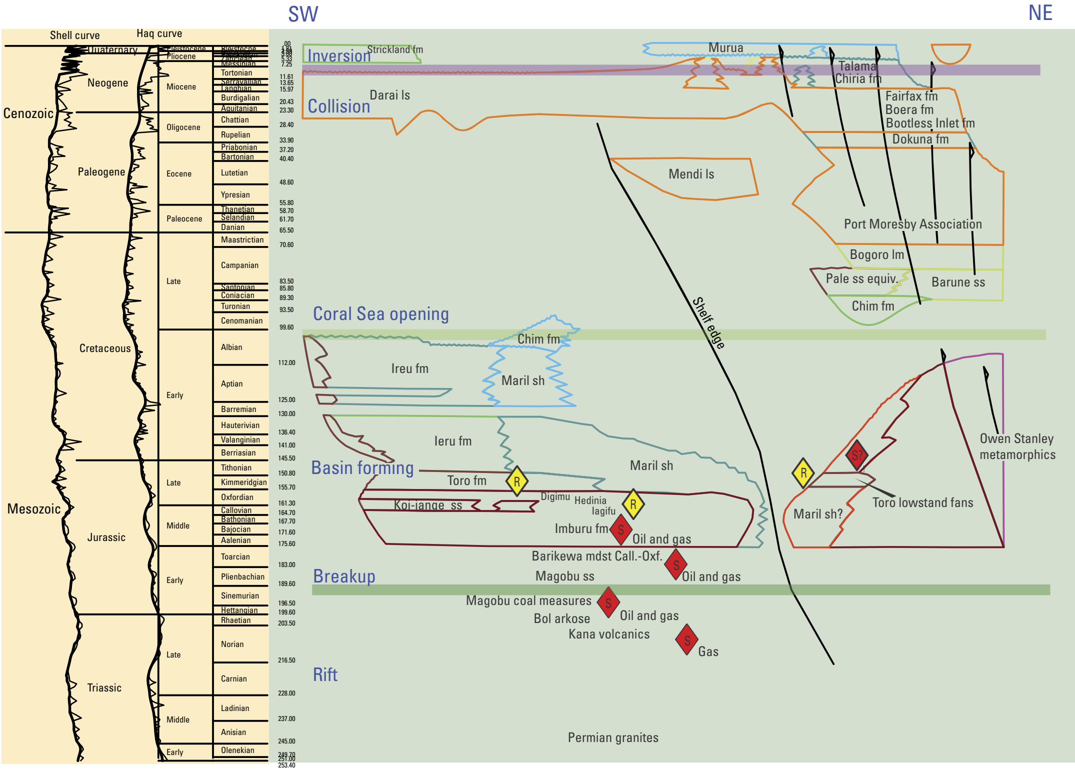
PAPUA NEW GUINEA SUBTHRUST PLAY AREA

Fig. 1



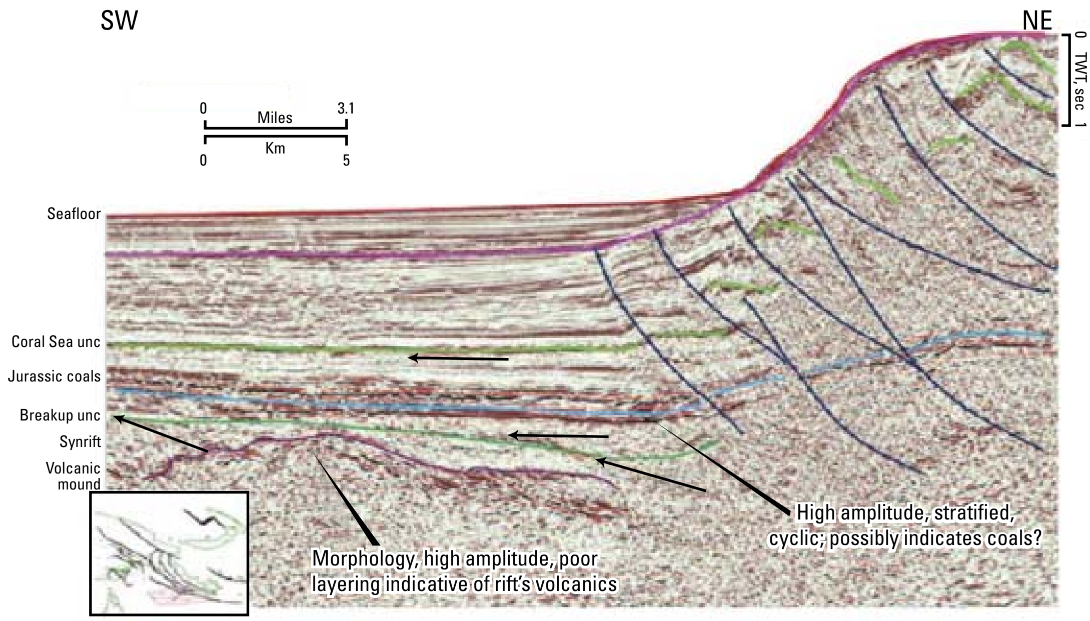
## PETROLEUM SYSTEMS AND SEA LEVEL CHANGES

Fig. 2




## SEISMIC SECTION IN AREA OF INTEREST

Fig. 3




However, the deepwater rocks are continental crust, and in fact the crust is thickening due to thrusting, so there is a hint of a possible subthrust structural play below the metamorphic and oceanic crust.

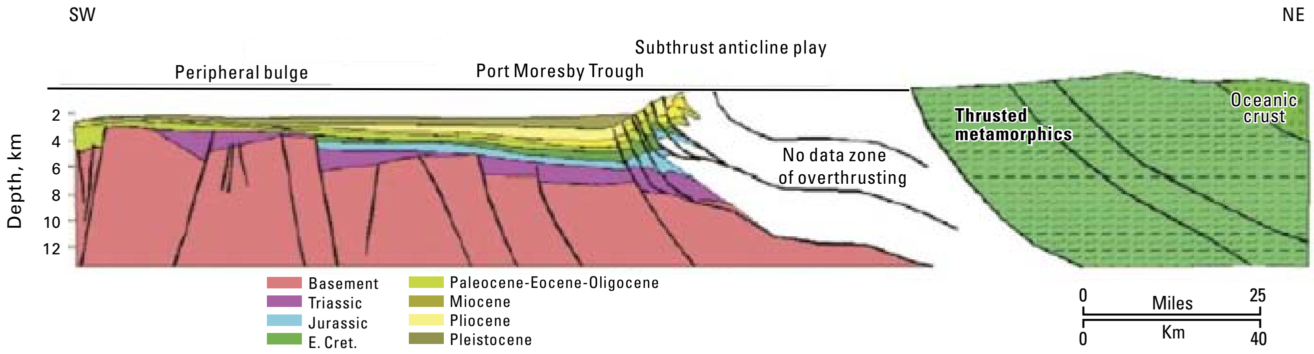
Blue Energy recognized these elements in its permits, and they form the basis of the subthrust play. With play development has come the need to reconcile known geological and geophysical results in the region.

With a literature review it quickly became obvious that little work has been done in the region. It has long been assigned as part of the Papuan basin, the eastern part or eastern Papuan basin. The proposal put here is that in fact it is a new basin, because a transfer fault separates the rigid Australian Plate basins from the Marginal Plateau basins.

There are some affinities with the Papuan Highlands fields, geology as well as onshore Australian Jurassic intracratonic basins in the pre-Coral Sea rift section, luckily as this contains the Mesozoic petroleum system. The challenge is to identify and confirm the petroleum system, and reports of oil seeps onshore in PPL 330 indicate that such a system does exist.

DEEP RIFT STRUCTURING AND COMPRESSIONAL OVERTHRUST OVERPRINT

Fig. 4




## Coral Sea development

The basin has had an interesting tectonic development (Fig. 2): Paleozoic (Permian and older) Gondwana sag basin deposition followed by Triassic-Jurassic-Cretaceous Gondwana synrift and postrift, where the rift was to the north. This makes the basin the last easterly Tethyan basin, and it is as yet undrilled.

This is followed by a second rift phase in the south, the Coral Sea opening, in the Late Cretaceous Early Tertiary. There was associated doming to the south as well as dislocation of the plate to form marginal plateaus that moved to the north, separated from the Australian Plate by a transfer fault.

There was continued spreading in the northern Melanesian island arc, which ceased in the Eocene and reversed in the Oligocene. There was collision between the arc and the Papuan basin at this time, but much later with the new basin, probably in the Miocene. Fold and thrusting occurred in the Pliocene, and then later inversion. The potential petroleum systems with this structural development are shown in Fig. 2, with the interaction of sea level changes and tectonic events.

The region has been deemed to have little potential due to high risk in source, reservoir, and charge.

- Reservoir risk—due to restricted distribution of Toro sandstone reservoir or equivalent.
- Charge risk—generation timing is critical to migration pathways and capture in developing anticlinal traps.
- Source risk—extent of downcutting of the Coral Sea unconformity into the Mesozoic Petroleum System, possibly removing the source rocks.

Time space plots show three major tectonic events characterized by structural rotation and erosion (Fig. 2). The Gondwana tectonics is a rift system with northward dipping normal faults and rift axis to the north. The Coral Sea unconformity is also associated with a seafloor spreading center, normal faults dipping to the south, and also a major transfer fault between the stable Australian Plate and the Marginal plateaus.

The collision event has created uplift and later downloading. So when considering the seismic interpretation of the basin, there is a need to look for three unconformities that are in effect the boundaries of three supersequences (megasequences, to quote current literature). There are numerous eustatic events, but with no rotation. So in fact these eustatic-derived unconformities will be parallel unconformities and in fact difficult to see on seismic.

## Seismic stratigraphy

Considering the regional gross section (Fig. 3) and zoomed region in Figure 3 and applying some seismic stratigraphy, it is possible to start to unravel the basin.

Seismic stratigraphic analysis shows starting from the bottom (oldest) and working up the section: Marginal plateaus are always relatively deep, so there is a need for a major event to lift, rotate, and subaerially erode the plateau.

The peripheral bulge is interpreted as the Coral Sea hinge zone where there is a transition between southerly dipping faults (Coral Sea opening related) to northerly dipping faults (Gondwana breakup related), and older sediments to the north have not been eroded out.

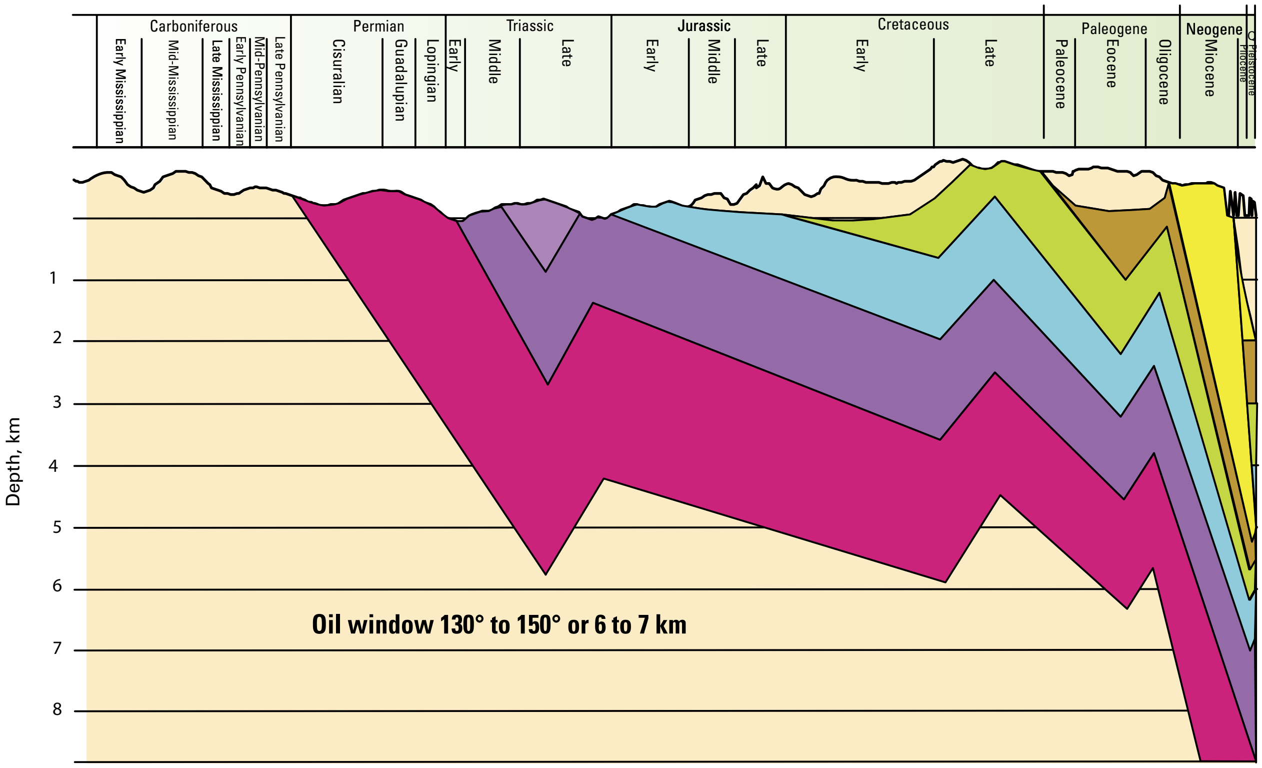
This is the central realization of the new play of a Tethyan petroleum system. The Gondwana breakup unconformity is characterized by angularity, rotation, and terrestrial section grading to deep marine. There is a thinning wedge to the south as expected as well as no thickening on immediate post sediments, hence no evidence of loading. The Jurassic coal event is characterized as cyclic, low frequency, bifurcation events, local unconformities, high amplitude, and evident even after 3 sec two-way time.

The signal strength is a key in assigning this as a coal event. There are few reflectors with sufficient impedance contrast to give such strong and coherent reflection packages. Salt and intrusives can be but are not the character seen on the section. The deep coal also is consistent with a terrestrial-lacustrine-shallow marine-deep marine transition, the rift-drift scenario of basin development. The shallow sediments, perhaps deep marine carbonates, are seismically “transparent.”

The sediment thickening direction in the Mesozoic related to the uncon-

## Geohistory of midslope location

Fig. 5




formity and not to volume creation due to downloading. The collision unconformity is evident and associated with the first thickening package, characterized as slope erosion and deposition with onlap with crustal thickening and associated downloading the implied tectonic regime.

The erosion on Pliocene implies the region was shallow-water at collision time, uplift then deepening with loading. The thrust faulting is evident as well as a detachment fault within a chaotic zone of poor coherency.

The fact that there is Eocene at coast implies massive nearshore anticline as the breakup unconformity is lifting at the slope. Or are there imbrications? More seismic is required inshore to answer this.

Seaward we note about 1.5 sec of sediment (precollision event), and to the north this increases to 3 sec, so this implies repeat section based on the Jurassic coal pick. Evidence for the detachment is that Miocene erosion to the left but not so much to the right of the detachment fault as well as a repeat section of Jurassic coals. Flat lying coastal zone could indicate anticlinal ramp thickening. In any case there are one, maybe two thrust sheets, and there may be additional plays within these sheets, in addition to the basement level plays.

### *Papuan differences*

So, interestingly we can extend to petroleum system characteristics away from the concerns and limitations of the nearby Papuan basin.

With respect to the Jurassic coals, it is postulated there are coal cycles, so providing source, reservoir, and seal. It is thought that structuring and hydrocarbon generation and migration will be synchronous as there has been shallow cool source rock until the downloading has pushed the source rock through the oil window. This downloading just preludes the anticlinal structures.

The distance to Owen Stanley fault is probably the edge of the continental block—so there is 40 km of fetch and migration is south into anticline. The gross rock volumes and expulsion volumes have yet to be calculated, but they should be significant.

The slope angle on the frontal thrust is short and steep, then there is 40 km of relatively flat seafloor and topography before mountain ranges are developed. This leaves sufficient room to develop a petroleum kitchen and substantial fetch.

Also, this topographical flatness can be used to imply a thrust ramp and not imbrications of the thrust sheet. Otherwise there would be significant mountain building at the coast. There would be mountain building at the coast merging directly into the slope, which there is not.

Crustal thickening supports overthrust model, as does to some extent the geoid anomaly over Port Moresby of 127 m, indicating an extra thick or overelevated land mass. Onshore



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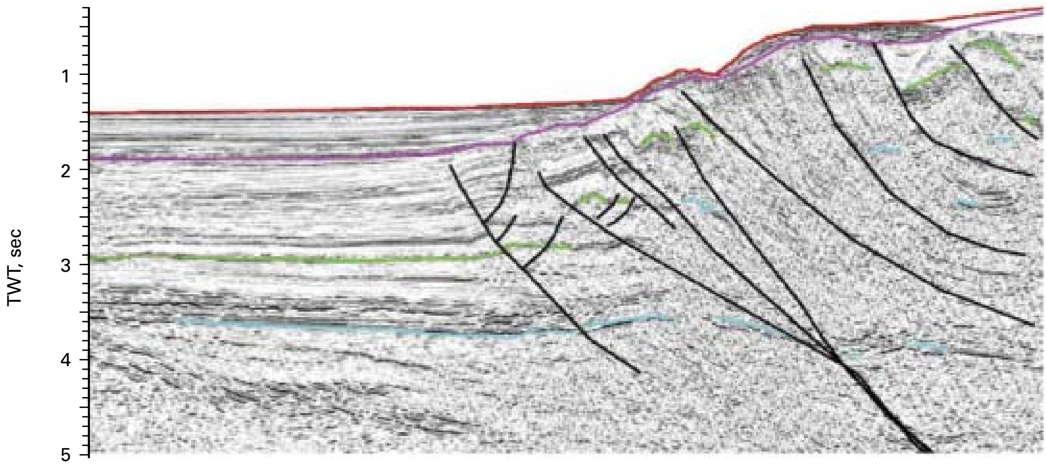
WATER-CORRECTED TIME SECTION OF FIG. 3

Fig. 6




haps more.

This presents a ground floor entry into a new basin with a very large position and exceptional exploration potential and opportunity. With a coal source, the system will probably be gas-condensate, but a mature marine Jurassic source cannot be ruled out. ✦

oil seeps imply an active petroleum system, and these are along the Eocene or mobile belt boundary as would be expected.

## Future exploration

Issues that will be clarified with future exploration include the nature of basement in the region, important to answer if there is a Permian-Triassic source in the rotated fault blocks. Is there any deepwater potential, currently ignored but still possible? A Miocene reef play is probably associated with the collision, but there is no seismic data yet to support this.

What this means is that Blue Energy's acreage position has a footprint of over one third of a new basin. More importantly the acreage covers the entire prospective fairway in the new basin. By analogy with the highlands there will be a structural density of over 40 anticlines in the fairway, per-

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## China

Pacific Asia Petroleum Inc., Hartsdale, NY, has spud a coalbed methane well on its 100% owned 175,000-acre Zijinshan Block in China's Shanxi Province.

Zijinshan, 150 miles east of supergiant Sulige gas field and 350 miles west-southwest of Beijing, is flanked by several CBM blocks held by Chevron Corp.

Awarded to the company in 2008, the Ordos basin block is near the west-east and Ordos-Beijing gas pipelines and another pipeline under construction and dedicated to CBM.

## Guinea

Hyperdynamics Corp., Sugar Land, Tex., let a contract to TDI-Brooks International, Houston, for a comprehensive oil seep study of the 31,000 sq mile concession off Guinea, West Africa.

Sample collection is to start in mid-October in three areas of known oil seepage.

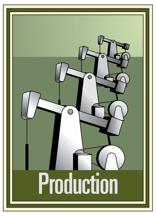
Hyperdynamics let another contract to GeoMark Research Ltd. to test cores taken on and offshore from previous years to differentiate source rock ages ranging from possible Silurian, Devonian, Jurassic, Early Cretaceous, to Barremian/Turonian rocks.

## Indonesia

Indonesia's first commercially drilled coalbed methane test well went to a TD of 1,950 ft in South Sumatra, cut a combined 90 ft of coal in five seams, and was cased to 878 ft. Ten more wells are planned by the end of 2009.

Operator PT Medco Energi Internasional Tbk, PT Ephindo of Indonesia, and CBM Asia Development Corp., Vancouver, BC, drilled the CBM-SE-02 well in the 58,349 ha Sekayu production sharing contract block.

Thicknesses are 20 ft in Palembang C, 40 ft in Palembang B, and in the lower Maura Enim unit, three seams totaling 30 ft of coal in Pangadang A. Medco shipped core from all five seams to the Geological Agency of Indonesia in Bandung, where gas content and saturations will be determined. An injection falloff test was successfully run in Palembang B to assess permeability.




GAS SHALE—Conclusion

# New plays emerge, although environmental issues arise

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New shale plays continue to emerge in North America and elsewhere, but issues related to the environment and land will affect commercial shale development.

This concluding article of a three-part series discusses the emerging plays as well as environmental considerations.

The first part (OGJ, Sept. 28, 2009, p. 39) discussed the seven main shale plays in North America, while the second article (OGJ, Oct. 5, 2009, p. 52) highlighted the strategic and technological lessons learned from a decade of modern shale development with horizontal wells.

## Emerging North American shales

Led by the Barnett (5 bcfed), Fayetteville (1.3 bcfed), and fast-rising Haynesville (1.1 bcfed), shale reservoirs currently contribute more than 8 bcfd to North American gas supplies. That is up from just 2 bcfd 5 years ago.

Development continues at a brisk pace within the geologically favored core areas of these proven shale plays, while depressed gas prices, in part due to the shale's success, have drastically slowed drilling in other domestic gas basins.

A couple dozen other new, deep shale plays are at various stages of appraisal (see table). Eastern shale plays have the edge, being generally older, thermally more mature and brittle, and benefitting from stronger wellhead prices (Fig. 1).

Western shales have suffered from the decrease in gas prices and generally lackluster tests but still have tremendous potential (Fig. 2).

Not all of these new shale plays will succeed. Advanced Resources views two plays to be potentially worthy: the Eagle Ford shale in South Texas and the Woodford-Cana shale in western Oklahoma.

## Eagle Ford (Texas)

Extending eastward out of the Maverick basin in a narrow belt across South Texas (Fig. 3), the Cretaceous Eagle Ford shale play emerged in 2008 on the heels of the Haynesville success, which it resembles in certain respects.

The Eagle Ford underlies the Austin chalk and is a source rock for the East Texas oil fields. Initial horizontal drilling provides encouragement but the number of wells drilled is insufficient for making a confident prediction on the long-term estimated ultimate recoveries (EURs) and economics.

About 300-ft thick and 11,000-ft deep, the Eagle Ford has a high 4% total organic carbon (TOC) content and a silty texture that is rich in brittle calcareous mineral components. As in the Haynesville, gas-in-place concentrations are high, in the range of 100-200 bcf/sq mile.

The play also has elevated (300° F.) temperatures. The 0.65 psi/ft reservoir pressure gradient, however, is lower than the 0.85 psi/ft gradient in the Haynesville.

Petrohawk Energy Corp. discovered the play by targeting the deeper, more mature areas. Petrohawk has locked up 210,000 acres with low royalties, mainly in La Salle and McMullen counties along the Edwards reef trend, in what appears to be the emerging central core of the play (Fig. 1).

Petrohawk's initial 11 horizontal wells produced at an average 8.9 MMcfed for the initial 24-hr rate, including significant condensate. With a $120 million in capital expenditures committed to the play in 2009, the company has two rigs running and plans to drill 29 operated wells.

In the Maverick basin portion of the play further to the west, Anadarko Petroleum Corp., ConocoPhillips, EOG Resources Inc., Rosetta Resources Inc., St. Mary Land & Exploration Co., and

### Emerging US gas shale plays

| Region | Shale play | Basin | Geologic age | Development stage |
|---|---|---|---|---|
| Midcontinent | Eagle Ford | Maverick | Cretaceous | Evaluation |
| Midcontinent | Woodford | Anadarko | Mississippian-Silurian | Evaluation |
| Midcontinent | Bend | Palo Duro | Pennsylvanian | Exploration |
| Southwest | Barnett | Permian | Mississippian | Exploration |
| East | Lower Huron | Appalachian | Devonian | Development |
| East | Utica | Appalachian | Ordovician | Exploration |
| Gulf Coast | Chattanooga, Floyd | Appalachian | Mississippian | Exploration |
| Gulf Coast | Conasauga | Appalachian Thrust Belt | Cambrian | Exploration |
| Gulf Coast | Tuscaloosa Marine | Gulf Coast | Cretaceous | Exploration |
| Rockies | Mancos, Manning Canyon | Uinta | Cretaceous | Exploration |
| Rockies | Pierre, Mancos, Niobrara | Raton | Cretaceous | Exploration |
| Rockies | Gothic, Hovenweep | Paradox | Pennsylvanian | Evaluation |
| Rockies | Baxter | Vermillion | Cretaceous | Evaluation |
| California | Monterey, McClure | San Joaquin | Miocene | Exploration |

TXCO Resources Inc. have established large positions but are proceeding cautiously with one rig apiece. Tests in horizontal wells in this area have produced from 3 to 6 MMcfed.

On the east and thermally less mature side of the play, Pioneer Natural Resources Co. has accumulated a 250,000-acre leasehold centered on Goliad County. Pioneer's first horizontal well tested 3.7 MMcfed, but flowed gas from only two of its five frac stages.

In all, Eagle Ford shale operators hold about 2 million acres in prospective areas of the play.

Drilling and completion in the Eagle Ford use Haynesville-style techniques. Laterals typically average 3,000-ft in length and the completions involve hydraulic fracturing with 2 million lb of sand proppant pumped in 8-12-stages.

Well costs are slightly less than in the Haynesville, in the range of $6 million/well long-term (all-in).

Petrohawk experimented with 18-stage fracs in two recent wells, reporting flatter production declines, albeit at additional cost.

## Woodford-Anadarko (Oklahoma)

Also known as the Cana play, the Woodford shale in the Anadarko basin of western Oklahoma is another emerging shale play with Haynesville-quality potential.

Deeper and more overpressured than its established Arkoma basin cousin and 200 miles to the east, the Anadarko Woodford shale has high (150-200 bcf/sq mile) gas-in-place concentrations. But well costs also are high and companies are still establishing the play.

Advanced Resources' mapping indicates that the geologic sweet spot traverses portions of Dewey, Blaine, and Brady counties, with drilling concentrated in western Canadian County. The Woodford shale is 12,000-15,000 ft deep, thermally mature with $R_o$ >1.1%, and a 0.7 psi/ft overpressured gradient.

Devon Energy Corp. holds 109,000 net acres in the play and estimates its potential at 5 tcfe net but has released no drilling results. The company currently has six rigs running and plans to drill 30 wells in 2009.

Cimerex Energy Co., running three rigs, holds 93,000 net acres in the Anadarko Woodford shale play, also concentrated in western Canadian County.

On the average, the 36 horizontal wells drilled in the play to date employed 3,600-ft laterals and included eight frac-stage stimulations.

The Anadarko and Arkoma Woodford plays are hotbeds for shale technology development. Marathon Oil Corp. is testing interventionless well completions in the Cana that involve perforations outside the casing and isolation valves within the casing (OGJ, Jan. 12, 2009, p. 44).

In the Arkoma, Continental Resources Inc. is testing simultaneous hydraulic fracturing of adjacent horizontal wells, coupled with real-time seismic monitoring.[1] Newfield Exploration Co. is testing super 10,000-ft laterals, as well as reverse osmosis with advanced oxidation processes (ozone, ultrasound) to treat frac water flowback.[2]

Gas recovery and economics in the Cana remain uncertain, but early indications show promise, probably exceeding 5 bcfe EUR for a well costing about $8 million.

## Other Eastern US shales

The Lower Huron shale in the West Virginia-Kentucky border region has moved into commercial development, with 200 MMcfd of production. This Devonian-age shale typically is 100 ft thick and 4,000-5,000 ft deep. TOC is reasonably high at about 3.5% but the <1.0% $R_o$ is fairly low as is the 0.3 psi/ft pressure gradient.

Wells employ shorter <3,000-ft laterals, foam fracs, and generally have EURs less than 1 bcf. Companies active in the play include Cabot Oil & Gas Corp., CNX Gas Corp., EQT Corp., Exco Resources Inc., NGAS Resources Inc., Penn Virginia Corp., and Range Resources Corp.

The Ordovician-age Utica shale underlies the Marcellus in Pennsylvania and New York. The Utica resembles the Haynesville in that it is 100-400 ft thick, +15,000-ft deep and overpressured, although TOC levels are only about half as high.

EQT, claiming 200,000 Utica-prospective acres, recently cored the shale in southwestern Pennsylvania at a 13,500-ft depth. Chesapeake Energy Corp. has cored the Utica from 9,000 ft in southeast New York's Chenango County. No operator yet has attempted a deep horizontal Utica well.

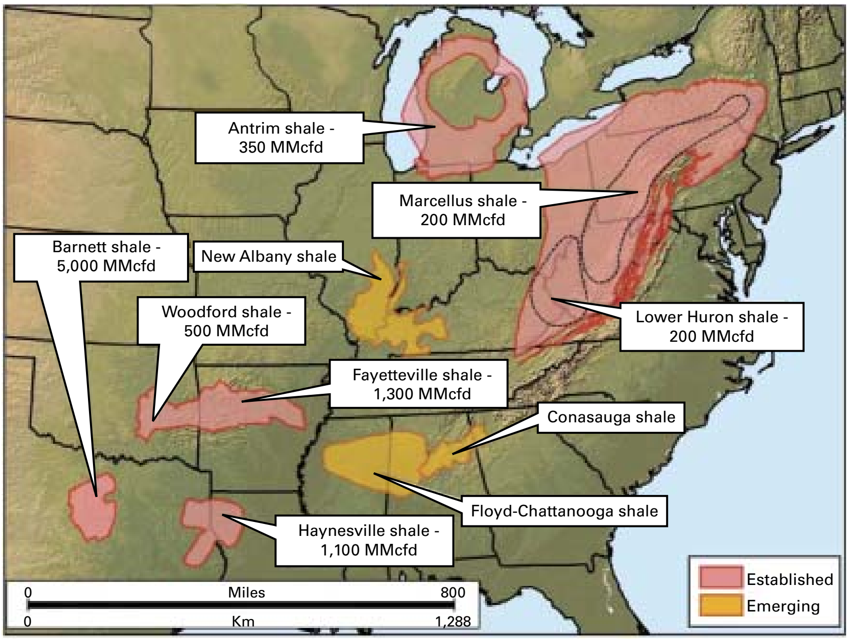
The onshore Gulf Coast also is an active area for shale exploration. This area holds the Cambrian-age Conasauga in Alabama, one of the oldest shales to be targeted anywhere, although it is complex structurally and disrupted by extensive thrust faulting.

Dominion Resources Inc. and Energen Corp. have drilled Conasauga test wells but encountered drilling problems and low flow rates.

The Mississippian-age Chattanooga and Floyd (or Neal) shales are stratigraphic equivalents with the Barnett shale. Best developed in central Mississippi, companies have been disappointed with well tests in the Floyd shale in part because the shale is 70% clay-dominated, which inhibits effective fracturing.

EASTERN US GAS SHALE PLAYS

Fig. 1




## Other Western US shales

Western shale plays, already contending with lower wellhead gas prices, frequently are less thermally mature and have a higher content of ductile clays. Production rates have been lower than in many Eastern shale plays, with very limited commercial development.

The key to unlocking the Western shales will be to target their more mature and quartz-rich zones, coupled with improvements in hydraulic fracturing techniques.

Hopes initially were high that the Permian basin Barnett shale of West Texas would match its Fort Worth basin equivalent, but this has not occurred. Initial flow rates generally have been below 1 MMcfd, while wells there are costly due to their greater depth, up to 18,000 ft.

The Bend shale of North Texas's Palo Duro basin was active several years ago until well tests proved disappointing. The Bend has good 2.5-4% TOC but is only marginally mature with a 1% Ro.

The Mancos in the Uinta basin appears to be one of the better western shale plays, with attractive TOC, depth, and thermal maturity. Questar Corp., Gasco Energy Inc., and Bill Barrett Corp. have had good results, achieving EUR's in the 1-5 bcf range.

The Manning Canyon shale in the Uinta is 2,000 ft thick, 7,000-11,000 ft deep, with attractive 1-4% TOC and a 1.2-1.5% Ro. A hard limestone that may provide a frac barrier underlies it. Companies testing the play included Shell Exploration & Production Co., Bill Barrett, and ConocoPhillips.

The Pierre and Mancos shales in the under-drilled Raton basin have fairly shallow 4,000-6,000 ft depths. Pioneer's early wells had EURs less than 1 Bcf, which is subeconomic at current gas prices. El Paso Corp.'s Niobrara shale wells in the Raton basin cost $2-3 million but have modest initial potentials (IPs) of 0.4-1.8 MMcfd.

The Gothic and Hovenweep shales in the Paradox basin are not particularly deep (5,500-7,500 ft) but do have brittle mineralogy with 50-85% quartz-carbonate. Bill Barrett reports spending $4 million for wells that initially produce at about 3 MMcfd.

Questar drilled more than 20 wells in the Baxter shale in the Vermillion basin, Wyoming, but initial flow rates were generally a modest 1 MMcfd. Drilling is on hold.

The Lewis shale at 10,000-15,000 ft depths of the Greater Green River basin is much deeper than its San Juan basin equivalent, has a more mature 1.1-2.0% Ro, and appears to be an excellent target awaiting horizontal shale testing.

Finally, the Monterey and McClure shales in California have rich 5-10% TOC, are highly siliceous, and have vast potential just beginning to be tested. Most areas, however, are thermally immature and oil prone.

## Global shale potential

Given the rapid and successful development of seven giant gas shale plays in North America, with their diverse ages and physical characteristics—yet all utilizing similar horizontal wells and large multistage fracs—there appears no reason to doubt the success for developing organic-rich shales in other regions.

Advanced Resources' exploration concept overseas is to follow known shale source rocks into deeper regions where they may have enhanced maturity, gas saturation, pressure gradients, and mechanical brittleness.

Early-stage exploration is under way in Australia, Poland, Sweden, and elsewhere, with little test data yet available.

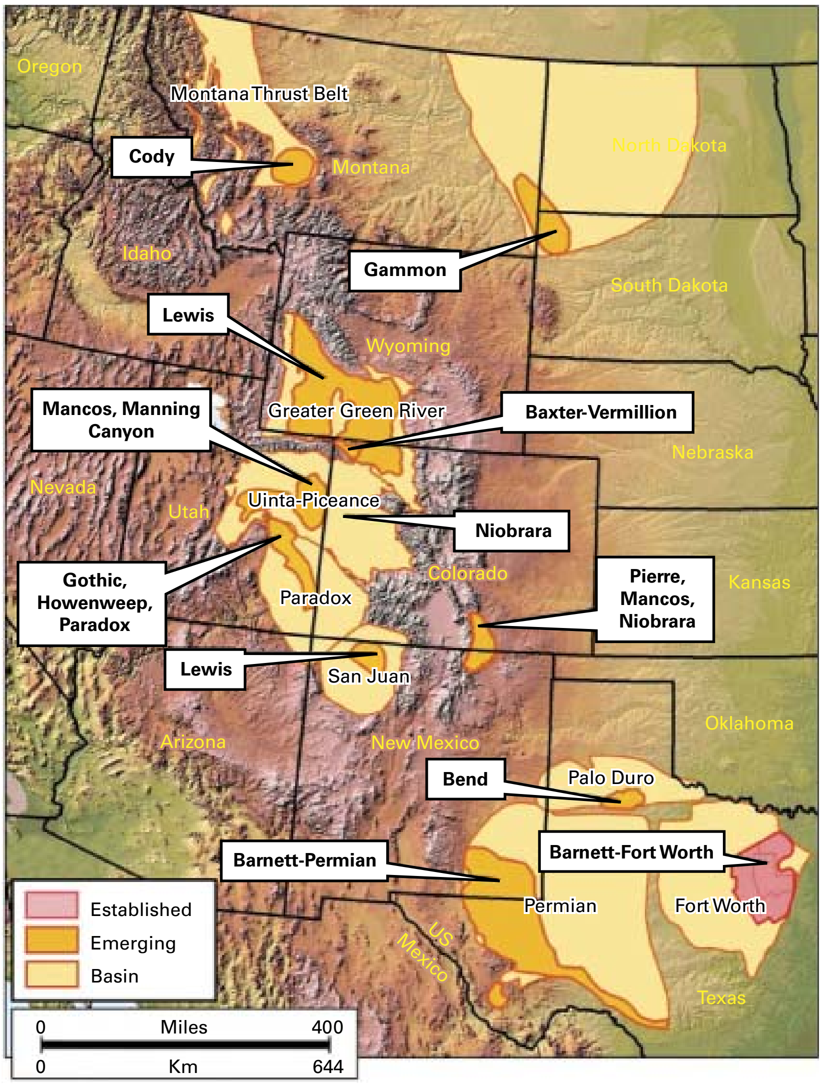
## Europe

Europe has appeal given the age, maturity, and stratigraphic data control of the gas shale targets, not to mention the strong gas markets.

In northern Poland, ConocoPhillips

WESTERN US GAS SHALE PLAYS

Fig. 2




recently teamed with Lane Energy Poland on a million-acre leasehold in the Baltic basin, targeting a 1,500-ft thick Silurian sequence that is silty, calcareous, and high in TOC (OGJ, Sept. 21, 2009, p. 52).

Nearby, BNK Petroleum Inc., also active in the Woodford shale, is evaluating 720,000 acres containing organic-rich Silurian shale that is 500-2,500 ft thick, 7,000-12,500 ft deep, and mature (1.2-2.6% $R_o$), with moderate 25-63% silica content.

The Jurassic Toarcian shale in the Paris basin covers an area larger than the Barnett shale play. It exists at comparable depths, is rich in organics with a 10% TOC, but is rather thin at 30-100 ft and appears to have low maturity. Eurenergy Resources Corp. and Toreador Resources Corp. are active in the Paris basin.

Shell is testing the Cambrian-Ordovician Alum shale in southern Sweden, which has a 70-200 ft thick oil shale with TOC up to 20%, though relatively immature.

Russia's Dnieper-Donets basin contains Devonian and Carboniferous black shales with a 3-13% TOC, and the Jurassic Bazhenov formation, the principal oil source rock in West Siberia, has 5-9% TOC and reaches a mature 1.3% $R_o$ in its northern extent.

Other operators evaluating gas shales in Europe include ExxonMobil Corp., OMV AG, and StatoilHydro.

## Australia

Gas shale drilling has lagged far behind coalbed methane development in Australia but the geologic potential is vast. Santos Ltd., Beach Petroleum Ltd., and Drillsearch Energy Ltd. are evaluating gas shale targets adjacent to producing gas fields in the Cooper basin of western New South Wales.

The thermally mature Cambrian and Ordovician Arthur Creek shale underlies the more remote Southern Georgina basin in central Northern Territory and western Queensland. The Horn Valley siltstone in central Australia's Amadeus basin is an Ordovician source rock that has fed conventional gas fields. This unit is about 150 ft thick and has a thermally mature 1-3% $R_o$.

Numerous other shales in Australia await testing.

## Other areas

Silurian black shales were sources for Algeria's oil fields in the Ghadames-Illizi basins. Morocco's Timahdit and Tarfaya oil shales may have deeper gas shale potential.

In South America, Cretaceous organic-rich shale source rocks are present in both the Maracaibo and Middle Magdalena basins of Colombia and Venezuela. Correlative with the Haynesville shale (Turonian-Cenomanian), this shale is 300 ft thick and has a TOC >10% in places, though $R_o$ appears to be mostly less than 1%.

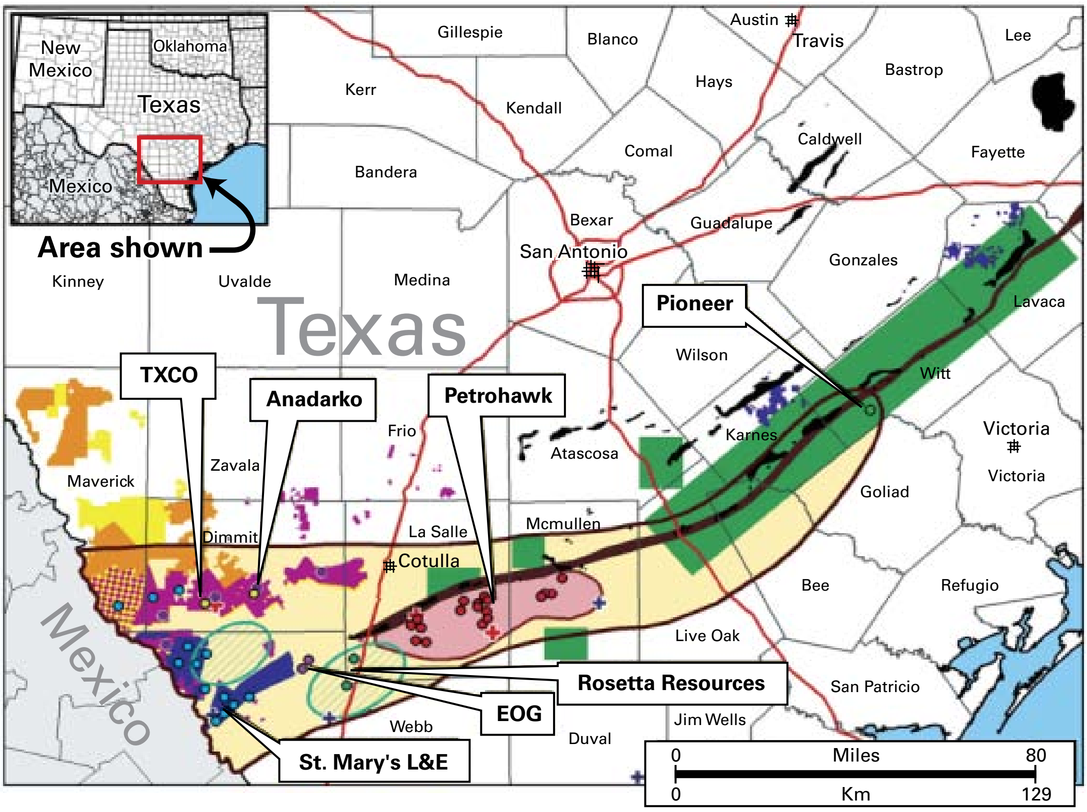
Clearly, gas shales have promise outside North America, although it will take extensive geologic work and more drilling to locate the sweet spots.

## Environmental considerations

Despite the fact that state regulatory oversight over hydraulic fracturing has been effective[3] and objective evaluations of reported incidents by environmental groups alleged to be caused by hydraulic fracturing have

EAGLE FORD GAS SHALE PLAY

Fig. 3




proven unfounded,[4,5] political pressure is calling for more active government oversight of hydraulic fracturing as well as shale gas development (OGJ, July 6, 2009, p. 18).

In some cases, these concerns have slowed or stopped development. For example, in New York, despite extensive activity in neighboring Pennsylvania, development of the Marcellus and Utica shales essentially has been halted pending completion by the state Department of Environmental Conservation (DEC) of a Supplemental Generic Environmental Impact Statement (GEIS) to update a 1992 GEIS.

In February 2009, the DEC released a final scope for the supplemental GEIS.[6] The GEIS was required to address water, surface disturbance, and hydraulic fracturing associated with gas shale development. The GEIS would also note noise, visual, and air quality concerns along with the potential for cumulative and community impacts. DEC originally planned for releasing a draft supplemental GEIS for public comment in spring 2009 but has not yet released it.

At the federal level, legislation introduced in Congress would give the US Environmental Protection Agency authority to regulate hydraulic fracturing under the Safe Drinking Water Act, reversing an explicit exemption for fracturing contained in the Energy Policy Act of 2005.

This legislation, the Fracturing Responsibility and Awareness of Chemicals Act, or FRAC Act, also would introduce a new requirement that companies disclose the ingredients used in proprietary fracing fluids.

Given the active development of the massive US natural gas shale resource, the industry needs improved and transparent communication. Industry could model such efforts after the Appalachian Shale Water Conservation and Management Committee (ASWCMC), a consortium of energy companies focused on efficient and responsible use of water associated with shale-gas development in the Appalachian region.[7]

Moreover, as shale gas development increases, particularly in new areas, and as production grows, a harsher "spotlight" will fall on natural gas.

Efforts to put a more environmentally friendly face on this activity could go a long way to enhance the environmental benefits of natural gas. Such efforts include capturing fugitive methane emissions from shale-gas development and production operations, further reducing the surface impacts of this activity, primarily through the use of multiple-well drilling sites, as well as the use of nontoxic additives in fracture fluids.[8]

In some areas, large-scale pursuit of hydraulic fracturing will require alternatives for water use and disposal.[9] In many cases, operators are taking proactive steps to look for alternative sources of water for fracturing, or in recycling fracture fluids for reuse.[10] In some cases, it could be more practical to treat the water to a quality that could be reused for a subsequent hydraulic fracturing job, or other industrial use, than treating to discharge to a surface water body. ✦

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*Scott H. Stevens' biography and photo were published in the first installment of this series (OGJ, Sept. 28, 2009, p. 39).*

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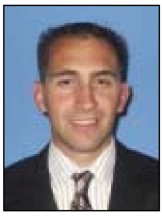

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# Tests gauge LED sensors for fuel-dye measurements

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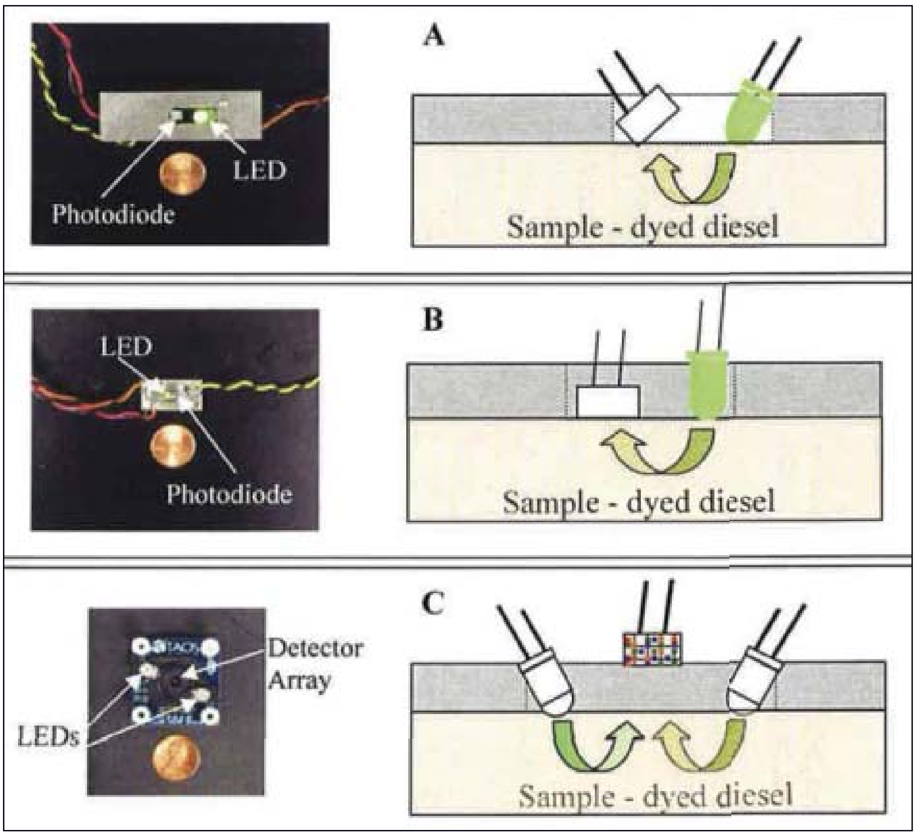
Certain classes of diesel fuel are dyed red under regulations of the US Environmental Protection Agency and Internal Revenue Service. The goals of these regulations are to minimize emissions and ensure tax-exempt fuel is not used on public roadways.

This article reports on development of a low-cost, rugged sensor for measuring fuel-dye concentrations that can be mounted on a pipeline sight glass at fuel refineries and terminals.

Studies conducted in this development used three different light-emitting diode/photodiode sensors to measure Solvent Red 26 in kerosine and Solvent Red 164 in diesel at concentrations ranging 0-43 mg/l. The sensors were tested with three different types of sample cells: a flow-through cuvette, 50-ml glass vials, and a 9.5-cm ID glass cylinder with 6 mm WT (to simulate a sight glass on a fuel-transfer pipe).

Each LED sensor exhibits different dynamic range, linearity, and sensitivity, which can be changed by altering the LED/detector angle. The sensors can readily measure dye concentrations several times lower and higher than the EPA and IRS requirements (2.2 and 11.1 mg/l., respectively).




*These are the breadboard sensors for detection of red dye in diesel: High-power LED with separate filtered photodiode detector (A); LED/filtered photodiode in a single integrated component (B); Dual white LEDs with red/green/blue filtered detector array (C; Fig. 1).*

## Regulations

IRS regulations require that tax-exempt fuel contain a level of Solvent Red 164 (SR164) dye that is spectrally equivalent to >11.1 mg/l. of a highly similar Solvent Red 26 dye (SR26) standard, which is available in pure form. SR164 is used to dye fuel because it less expensive than SR26 and has alkyl hydrocarbon chains that improve fuel solubility.

EPA regulations only require a dye concentration that is one fifth as high as the IRS levels. The higher dye concentration required by the IRS readily enables detection of dyed fuel that may have been diluted with undyed fuel.

Solvent Red dyes can be readily measured in fuels with optical spectroscopy,[1] in which the use of spectral derivative processing removes the broad absorption band in the 500-600 nm region exhibited by fuels, allowing accurate measurement of the more narrow Solvent Red absorption bands in that region.

The American Society for Testing and Materials International has a published method that uses visible absorption spectroscopy to determine SR164 dye in diesel fuels.[2] These methods are highly quantitative and considered "gold-standard" measurement techniques for the determination of Solvent Red in fuel. They also, however, require instrumentation that is not low-cost and significant involvement of an operator for sample measurement and data processing.

The estimated 1,500-2,000 fuel distribution terminals throughout the US[3] mix liquid dye concentrates with undyed fuel immediately before delivery to a carrier. To ensure a carrier receives the correct fuel (and pays appropriate taxes), dye dispensing and mixing systems at the distribution terminals employ a number of security measures.

All these security measures, however, involve administrative and engineering controls that limit tampering, etc. A better way to confirm that dye is being or has been added to fuel is simply to perform a direct measurement of the dye in the fuel after mixing.

The goal of the work reported on here was to develop a low-cost, robust sensor to allow direct measurement at refineries and fuel terminals of Solvent Red 164 dye concentration in off-road fuel. Optical absorption sensors based on light-emitting diodes are rugged and low-cost, have low power consumption, and can be designed to be intrinsically safe.[4]

LED-based systems have been used in a variety of chemical-detection applications including heavy metals, pH, $CO_2$, and $O_2$.[5-8]

Our approach was to develop a sensor that could be mounted on a pipeline sight glass, precluding the need for direct contact of the sensor with the fuel. This article reports on the design and testing of three different LED/photodiode sensors using reflectance spectrometry for measuring dye concentration.

## LED sensor designs

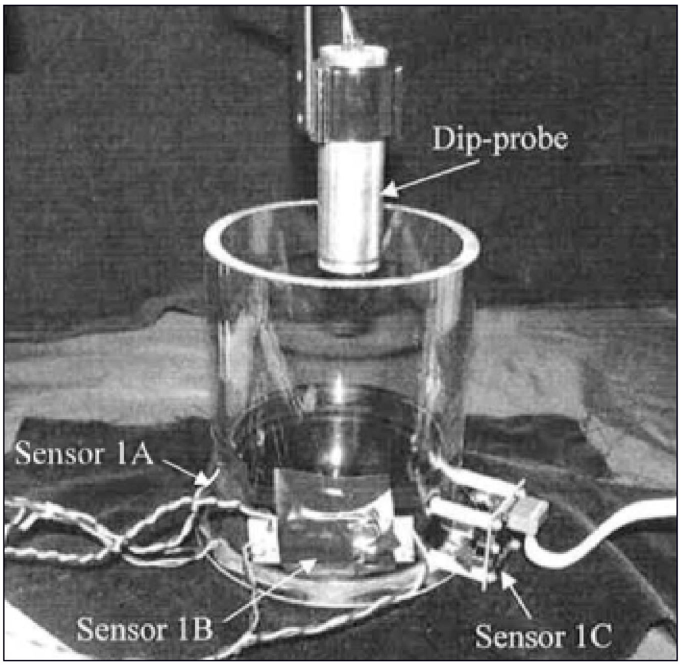
Two sensors were constructed that use a green filtered photodiode light detector and a green LED emitter that overlaps with the primary absorption band for Solvent Red 164 and Solvent Red 26 dye standard. A more sophisticated sensor employed dual white LEDs for sample illumination and an array of filtered photodetectors providing light-absorption data output in three separate wavelength channels (red, green, and blue). Fig. 1 shows photographs and schematics of the sensors.

The larger sensor (A; Kingbright, City of Industry, Calif.) uses an 18,000 millicandela InGaN LED with a 520-nanometer center wavelength, a spectral line half-width of 35 nm, and a 20° viewing angle. The photodetector includes a single component green filtered photodiode detector with integral lens, amplifier, and light-to-voltage converter (from Texas Advanced Optoelectronic Solutions, Plano, Tex.). The filter has a peak transmission at 540 nm with a full-width-half-max (FWHM) of ~80 nm. All additional electronics are on the back side of the circuit board shown in Fig. 1(A).

The sensor shown in Fig. 1b (from TAOS, Plano, Tex.) is based on a single integrated component containing a green LED (567 nm center wavelength, spectral line half-width = 26 nm), filtered photodiode detector (540 nm peak transmission, FWHM = 80 nm), amplification, and light-to-voltage conversion electronics. Although this sensor has a much lower intensity LED, it is significantly smaller, costs less, and requires minimal ancillary electronics.

The sensor shown in Fig. 1 (C; from TAOS, Plano, Tex.) has two white LEDs and an 8 by 8 array of photodiodes: 16 photodiodes have blue filters, 16 photodiodes have green filters, 16 photodiodes have red filters, and 16 photodiodes are clear with no filters. The position of the filters is randomized to provide better averaging of object color.

A voltmeter (from Fluke, Model 187, Everett, Wash.) was used to read the output of the photodiodes for the sensors shown in Figs. 1(A) and 1(B). A vendor supplied-software package recorded the output of the red, green, and blue channels for the sensor shown in Fig. 1(C).




*This 9.5-cm ID glass sampling chamber was used for final sensor testing (Fig. 2).*

## Sample cells

The sensors were tested with Solvent Red 26 in kerosine and Solvent Red 164 in diesel at concentrations ranging 0-43 mg/l. Air samples (no fuel present in sample cell) were also measured.

Three different types of sample cells were tested:

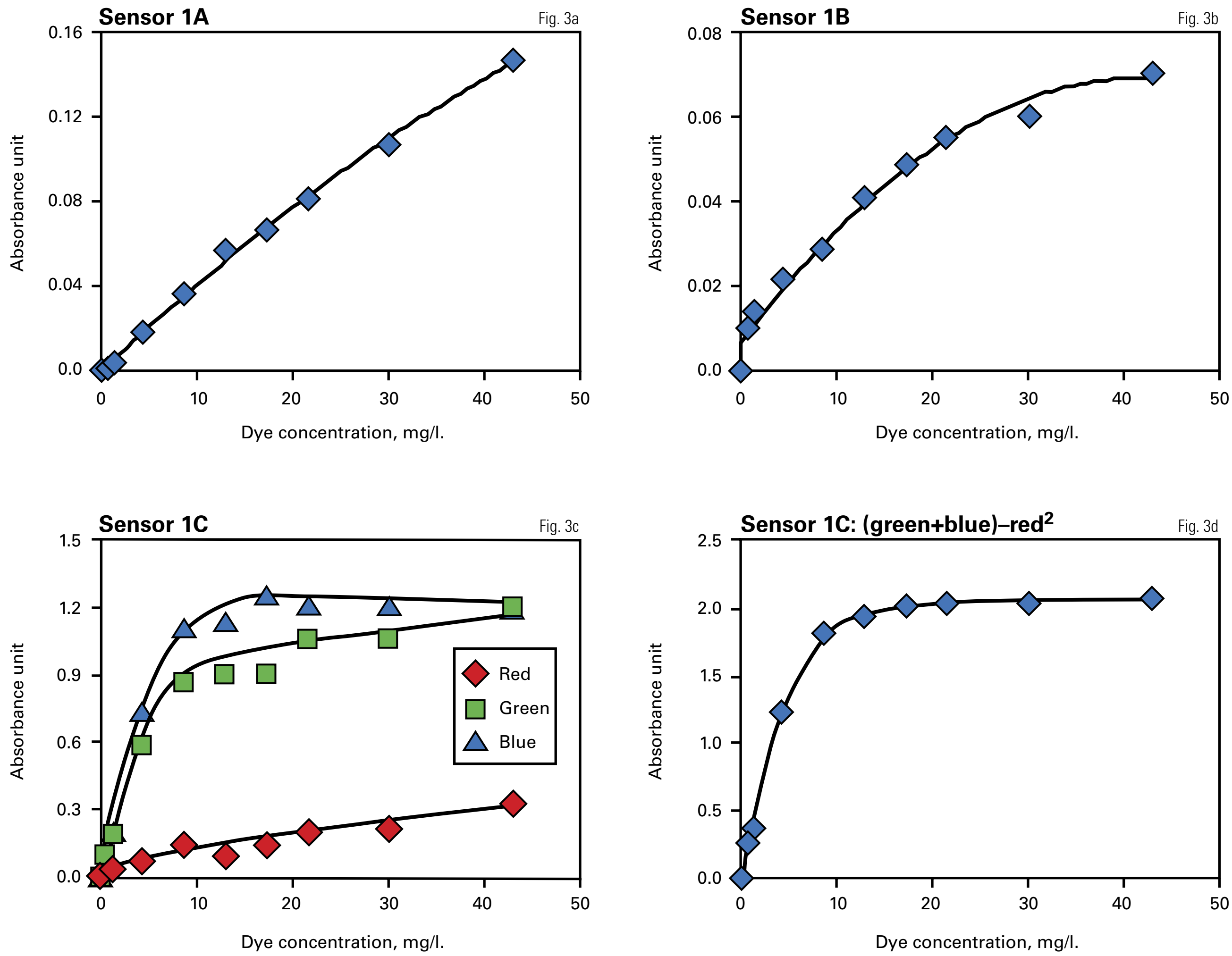
1. An optical-quality grade flow-through cuvette.
2. 50-ml standard glass vials used for collection of environmental water samples.
3. A 9.5-cm ID glass cylinder with 6 mm WT (to simulate a large transfer pipe).

The three sensors were mounted to the flow-through glass cuvette with 1-cm path length for initial testing in kerosine with Solvent Red 26. Only one reading per sample was taken for initial testing.

Five replicate measurements for each sample were made with a 50-ml glass

ALL SENSORS: SR26 IN KEROSINE[1]

Fig. 3




[1]Using a flow-through cuvette measurement cell. [2]A "normalized" absorbance value is used, subtracting the red channel absorbance from the sum of the green and blue channel absorbance.

vial sample chamber with 2.5 cm ID and 1.5 mm WT. These tests were performed with Solvent Red 26 in kerosine and Solvent Red 164 in diesel for the three sensors.

Final testing was performed by the sensors being mounted on the outside of a glass cylinder with 9.5-cm ID and 6-mm WT to simulate a large fuel-transfer pipe (Fig. 2). The 6-mm WT was used to simulate more closely the thickness of a sight-glass on a fuel-transfer line that could provide a convenient location for mounting these types of sensors.

Fig. 2 also shows a dip-probe sensor, which is not discussed any further here, and no data are shown. Dyed diesel samples (300 ml) were introduced into the sampling chamber, and data from each of the three sensors were collected sequentially to avoid interference among sensors. Kerosine standards were not measured with this sampling chamber. After measurement, samples were removed with a large-volume pipette, and the chamber rinsed with a small amount of the next sample to reduce carryover. Samples were measured in the order from lowest to highest concentration.

The broad absorption band of the Solvent Red dyes results in light attenuation in both red and blue spectral regions with a smaller amount of attenuation in the red region. For these sensors, the amount of light detected is inversely proportional to the dye concentration in the sample.

A summary of results appears presently.

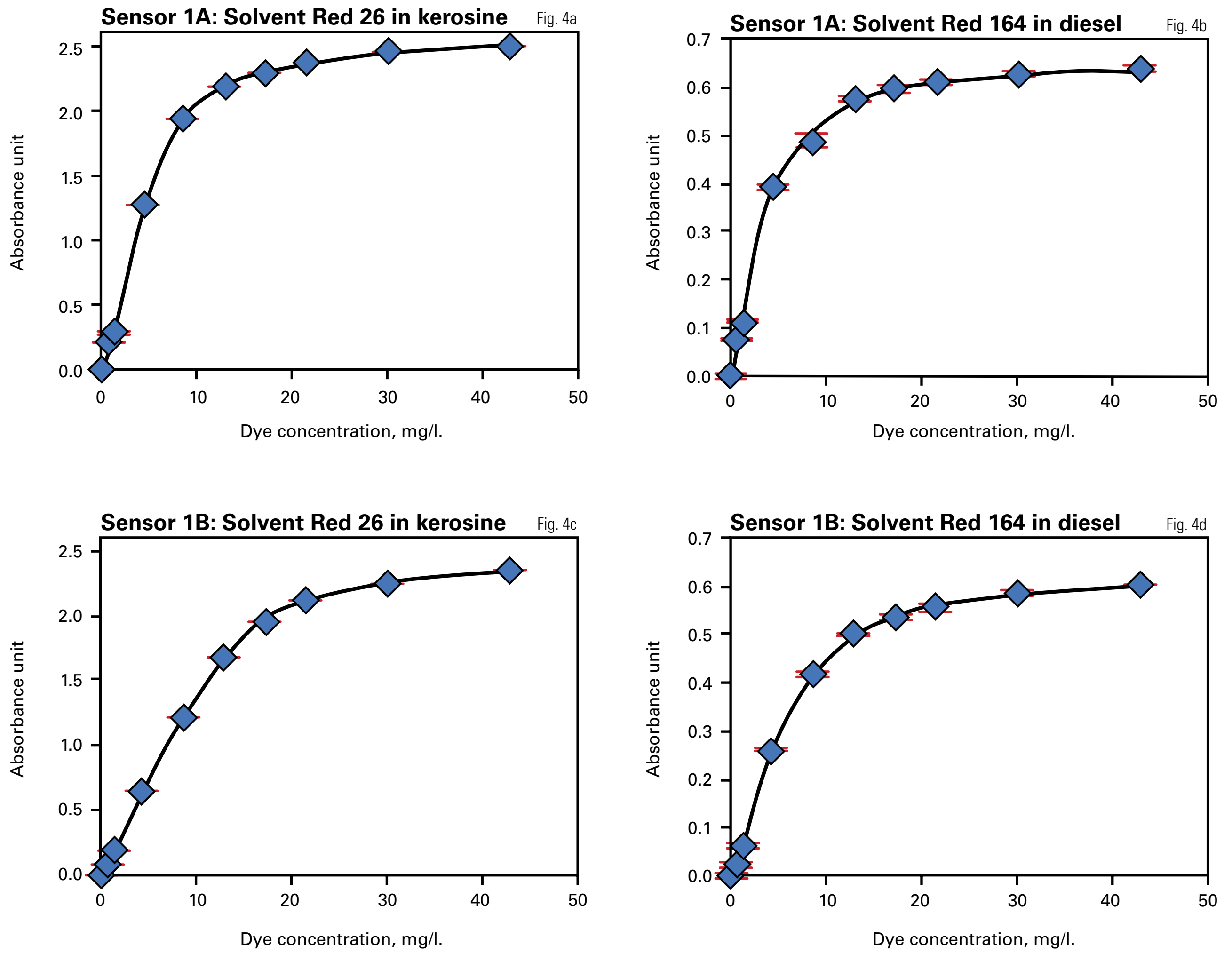
Sensors are designated as 1A, 1B, and 1C, according to Fig. 1. All data have been converted from raw detector output voltage to absorbance units. Absorbance was calculated with the following relationship:

$$A = -\log_{10}(I/I_o)$$

Where:
A = absorbance

SENSORS 1A, 1B: SR26, 164 IN KEROSINE, DIESEL*

Fig. 4




*Using a 2.5-in. ID measurement chamber; data points represent the average of five measurements.

$I$ = sample voltage reading
$I_o$ = blank (0 mg/l.) voltage reading

## Flow-through chamber

Flowthrough cuvette measurements were only made on Solvent Red 26 standards in kerosine. Only a single sample was measured at each concentration.

As Fig. 3 shows, each sensor has advantages with regards to its sensitivity and dynamic range for this particular sampling or measurement configuration. Sensor 1A has poor discrimination of low dye concentrations but good dynamic range. Sensor 1C has excellent sensitivity but poor dynamic range. Sensor 1B is in between these two extremes.

Fig. 3d illustrates the improvement in measurement uniformity when multiple channels are used to compute a final reading. It is important to note that for Sensor 1A and 1C, the angle of the LEDs relative to the detector can be changed and set as desired.

As the LEDs are angled towards the sensor, the depth of penetration of light into the sample decreases, resulting in improved dynamic range but decreased sensitivity. As the LEDs are angled away from the detector, the light is forced to travel a longer path before reaching the detector (via solution backscatter) resulting in greater sensitivity but decreased dynamic range.

## Glass vial chamber

Following successful demonstration of the sensors with a simple flowthrough cuvette, each sensor was then mounted in a fixture so that it contacted the outer surface of a 50-ml round glass vial. Dyed kerosine and diesel samples were dispensed and aspirated into the vial for each measurement. Five replicate readings were taken for each sample by aspirating and redispensing the sample into the vial.

The plots in Fig. 4 include error bars, but because standard deviations were generally <1%, the error bars are not apparent. Fig. 4 shows data for sensors 1A and 1B. Sensor 1A yields absorbance values that are about four times higher vs. Sensor 1B. The response of both sensors begins to plateau at dye concentrations greater than about 20 mg/l. Absorbance values for diesel are slightly lower for kerosine for the same sensor, which may result from the slightly greater back-reflectance of light from diesel. When compared with data from the flow-through cuvette, Sensor 1B yields absorbance values about 16 times higher.

These differences are likely primarily due to the greater amount of backscatter from the cell walls in the smaller flow-through cuvette, leading to lower apparent absorption values. Because changes were made to the angle of the LEDs for Sensor 1A, absorbance values for the 50-ml vials (2.5 cm ID) cannot be directly compared with the flow-through cuvette results.

Fig. 5 shows data for Sensor 1C. This sensor requires an initialization at power-up and depending on the background presented to the sensor, each channel (red, green, and blue) is assigned a different gain setting. Initialization was with a 0-mg/l. standard for these measurements.

As Fig. 5 shows, the red channel was saturated at all dye concentrations (i.e., no difference in light intensity vs. blank). As with the flow-through cuvette measurement, this measurement scenario also resulted in the blue channel giving higher absorbance values than the green channel.

Reproducibility was excellent. Absorbance values for this measurement chamber are lower than the flow-through cuvette data but cannot be directly compared because changes were made to the angular position of the LEDs relative to the detectors.

To illustrate the dependence of the LED placement angle relative to the photodiode detector, measurements were taken with the angle between the LED and photodiode for Sensor 1A at ~90° and ~120° (Fig. 6).

At greater angles (i.e., LED directed more towards the detector), the sensor is less sensitive, but the midpoint of the response curve is closer to the 11.1-mg/l. IRS-required dye concentration. This allows more accurate measurement of dye concentrations in the vicinity of 11.1 mg/l. at the expense of being unable to quantify dye concentrations of less than ~1 mg/ml.

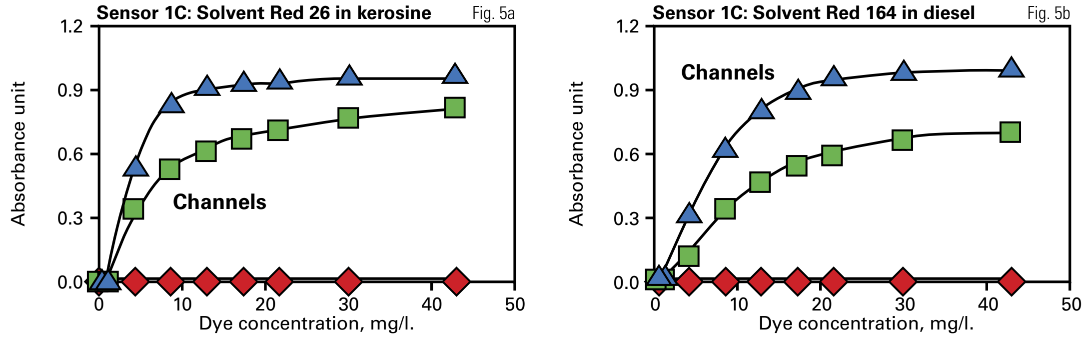
## 9.5-cm ID chamber

A final test for the sensors attempted to simulate measurement in large-diameter fuel transfer pipes and through thick sight glass. Each sensor was mounted on the outer circumference of a 9.5-cm ID glass cylinder with a 6-mm WT. Sensors 1A and 1C were modified by changing the LED/detector angle to produce readings that were near half detector saturation at dye concentrations of 11 mg/l. The diesel sample (300 ml) was added and each sensor sequentially powered up, measured, and then powered down.

Different concentrations of dye were made by a small known volume of 3.4% Solvent Red 164 dissolved in xylene into the cylinder and mixing well before repeating the measurement sequence with all the sensors. Because

SENSOR 1C: SR26, 164 IN KEROSINE, DIESEL*

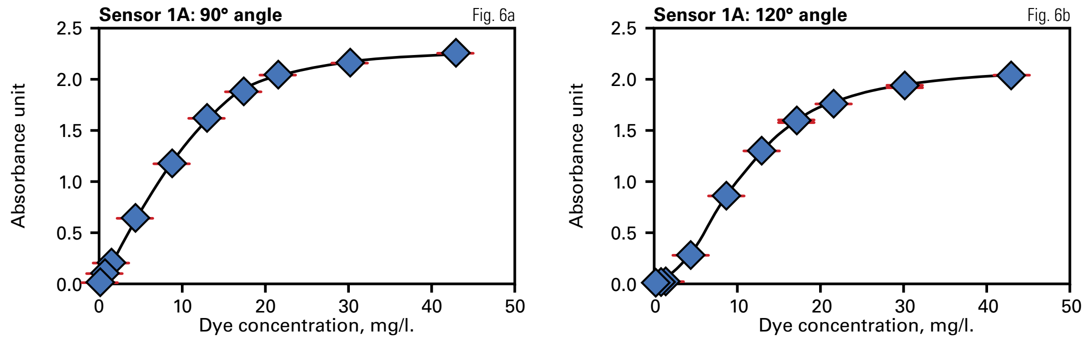
Fig. 5




*Using a 2.5-in. ID measurement chamber; data points represent the average of five measurements.

SENSOR 1A: DEPENDENCE ON ANGLE*

Fig. 6




*LED/detector relative angle; Solvent Red 164 in diesel.

the volume of dye added was less than 1 ml, the effect of the additional dye volume on the final concentration in the 300-ml sample was negligible (<0.5%).

Fig. 7 shows data for the three sensors.

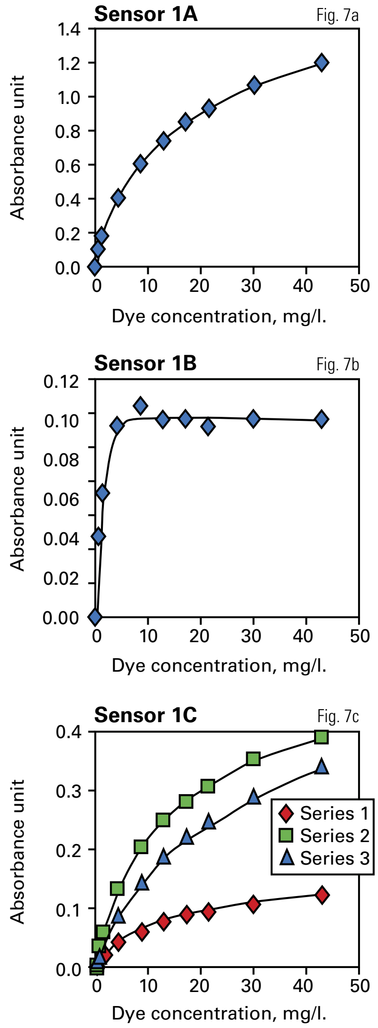
Sensors 1A and 1C show excellent correlation of light absorbance with dye concentration, with good discrimination of dye concentrations well above and below 11.1 mg/l.

All three channels (red, green, blue) of Sensor 1C showed good correlation of absorbance with dye concentration at all concentrations. Sensor 1B could not discriminate dye concentrations above ~10 mg/l. but had excellent sensitivity at dye concentrations less than ~10 mg/l. The penetration depth of light into the sample for Sensor 1A was likely significantly affected by the thick glass walls of the sampling vessel, as shown by the low absorbance values.

All sensors exhibited significantly lower absorbance values relative to data collected in the smaller sample vessels, which is likely due to the reduction in back-reflection from inner walls of the large sampling chamber.

It should also be noted that all sensors had absorbance readings that were significantly lower in air (vs. 0 mg/l. dye concentration in diesel) that could be exploited to indicate the presence of fuel vs. air in a fuel-transfer pipe.

**SENSORS: SOLVENT RED 164, DIESEL*** Fig. 7




*Using a 9.5-cm ID measurement chamber; all data points represent a single measurement.

## Results

Sensor designs 1A and 1C show significant promise for use as fuel-dye monitors at refineries and fuel terminals. Other sensor designs (1B) may also have utility for fuel-dye monitoring. These sensors can readily measure the IRS 11.1-mg/l. dye concentration requirement; Sensors 1A and 1C can discriminate concentrations several times lower and higher, depending on LED/detector angle.

The component costs for these sensors range from $1-10, providing an extremely cost-effective means of monitoring fuel-dye concentration. The LEDs have extraordinarily long lifetimes (~10,000 hr), which can be extended by pulsing the LEDs and only powering them during intermittent measurements, since LEDs require no warm-up time.

The sensors can be mounted in explosionproof housings and absorption measurements can be made through thick sight glass. Sensor outputs are easily data-logged and can be linked with other equipment, monitors, and alarms. Multiple sensors of the same or different type can be integrated for redundancy and improved accuracy.

While not explored here, sensors incorporating different wavelength channels (for example, sensor design 1C or variants of it) should allow accurate measurement of fuel-dye concentrations over a range of conditions and sample types by allowing compensation for color, density/refractive index differences, air bubbles, background fluorescence, and particulates.

## Acknowledgment

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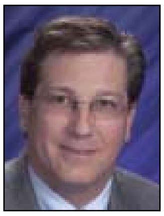

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# Europe studies variables of common CCS approach

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Bredero Shaw
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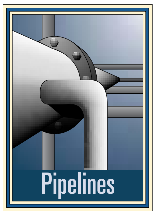



A common European approach toward carbon capture and sequestration and toward developing an integrated carbon dioxide transportation network will help address $CO_2$ emissions.

Carbon dioxide transport infrastructure will be a key component of any future carbon capture and sequestration plans. Pipelines are the most economical means of moving most sequestered $CO_2$, based on location of the supply sources (large industrial compounds) and potential injection sites (large depleted oil and gas reservoirs, saline aquifers).

The pipeline industry is therefore preparing the first scenarios for developing carbon dioxide pipeline networks, while authorities and other organizations examine creating a standardized framework for such networks: DNV $CO_2$PIPETRANS (OGJ, Sept. 14, 2009, p. 14) and the European Union CCS Directive proposal discussed in this article.

## *EU directive*

In January 2008, the European Commission—the main source of legislative initiatives in the EU—advanced a proposal for a directive on the geological storage of $CO_2$. Although different sections of previous EU legislation already addressed some aspects of CCS, this was the first initiative to integrate in one document the principles of its future development in the EU.

The proposal went through the normal cycle of public and industry consultation and was approved and published in the Official Journal of the European Union on Apr. 23, 2009, under the title Directive 2009/31/EC of the European Parliament and of the Council on the geological storage of carbon dioxide.[1]

The Directive also has European Economic Area relevance, meaning it can be used by the countries that are not members of the EU but are members of the EEA: Norway, Switzerland, Iceland, and Liechtenstein.

The EU Directive considers CCS a bridging technology to reduce $CO_2$ emissions. According to the directive, and based on the EU's target of 20% reduction in greenhouse gas emissions by 2020, 7 million tonnes of carbon dioxide could be stored by 2020 and up to 160 million tonnes by 2030. CCS will be only one of the tools used in reducing greenhouse gas emissions, representing 15% of the reductions required in the Union by 2030.

Directive 2009/31/EC covers the geological storage of carbon dioxide with a total intended storage of more than 100 kilotonnes within the territory of the EU countries, their offshore exclusive economic areas, and continental shelves.

The main objectives of the EU CCS Directive are to:

- Create a regulatory framework allowing CCS to be developed and operated in an environmentally safe way.
- Define the basic rules for the safe storage and transportation of $CO_2$.
- Propose mechanisms to encourage both public and private sector financing of the development and implementation of large-scale CCS projects and networks.
- Encourage the research and devel-

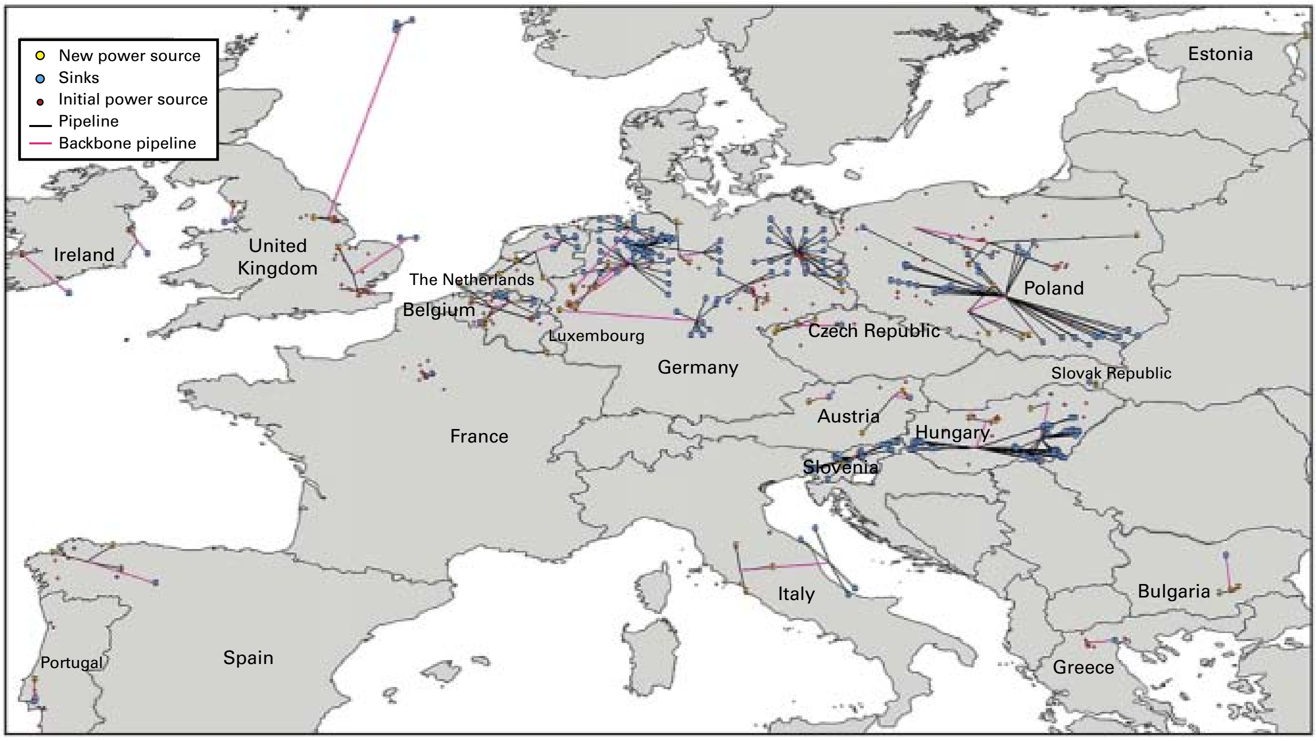
### CUMULATIVE EUROPEAN $CO_2$ PIPELINE LENGTHS

| OD | 2020 | 2025 | 2030 |
|---|---|---|---|
| | | km | |
| ***Member-states scenario*** | | | |
| 324 mm, 12.75 in. | — | 236 | 2,074 |
| 406 mm, 16 in. | — | 157 | 1,644 |
| 610 mm, 24 in. | — | 94 | 1,647 |
| 762 mm, 30 in. | — | 51 | 921 |
| 900 mm, 36 in. | — | 19 | 459 |
| **Total** | **—** | **557** | **6,744** |
| ***European scenario*** | | | |
| 324 mm, 12.75 in. | 3,274 | 5,612 | 12,960 |
| 406 mm, 16 in. | 3,604 | 6,389 | 13,856 |
| 610 mm, 24 in. | 1,201 | 3,849 | 10,088 |
| 762 mm, 30 in. | — | 2,078 | 6,077 |
| 900 mm, 36 in. | — | 770 | 2,601 |
| **Total** | **8,079** | **18,698** | **45,581** |

Source: Author estimates based on Annex VII of the European Commission Staff Working Document, "Accompanying Document to the Proposal for a Directive of the European Parliament and Council on the Geological Storage of Carbon Dioxide—Impact Assessment," 2008

## $CO_2$ PIPELINES IN EUROPE; MEMBER STATES SCENARIO

Fig. 1




Source: Annex XII of the European Commission Staff Working Document, "Accompanying document to the Proposal for a Directive of the European Parliament and of the Council on the Geological Storage of Carbon Dioxide – Impact Assessment," 2008.

opment of the most economical CCS technologies.

The directive asks member states to create conditions for open and nondiscriminatory access to $CO_2$ transport networks and storage sites. It also requires countries to create all necessary conditions for the cross-border transportation of $CO_2$. EU legislation relative to transporting waste materials is to be amended to exclude $CO_2$ transported for the purpose of geological storage.

Issuing any $CO_2$ storage permit will require a description of the transportation method. Existing EU legislation on permitting new large fossil-fuel power plants will be amended to include the economic feasibility of $CO_2$ transportation from such a source to the potential storage sites (sinks).

### $CO_2$ drivers

Assessing the future of $CO_2$ pipelines in Europe requires first understanding the main network development drivers. These include the development process of the pipeline network, as well as other factors having an effect such as development of enhanced oil and gas recovery—EOR, EGR—or the potential use of existing oil and gas pipeline infrastructure for future $CO_2$ transportation infrastructure.

The implementation of CCS projects will be gradual, extending the development of a $CO_2$ pipeline network across several stages. Relatively short point-to-point pipelines will initially link demonstration and early stage $CO_2$ sources with the most promising storage sites in their proximity. As CCS implementation advances, some regions or countries are likely to develop hub-and-spoke pipeline networks, optimizing transportation between their domestic $CO_2$ sources and available domestic sinks.

When CCS becomes the norm—or if the EU at some point makes it mandatory—regional networks will be linked in a pan-European pipeline network balancing the storage deficit of some regions with the excess storage capacity of other regions. Costs and problems will be more important during the local point-to-point and regional hub-and-spoke networks, while the pan-European stage will definitely offer cost benefits through network effects, while at the same time requiring management of issues such as cross-border pipelines.

Regionally focused studies have assessed the potential contribution of enhanced hydrocarbon recovery to the development of a $CO_2$ pipeline network in Europe.[2] All have concluded, contrary to the situation in regions actively producing fossil fuels such as the US, that EOR and EGR will play a limited role in Europe. Most oil and gas fields in the region will be depleted by the time CCS industry growth allows captured $CO_2$ to reach them.

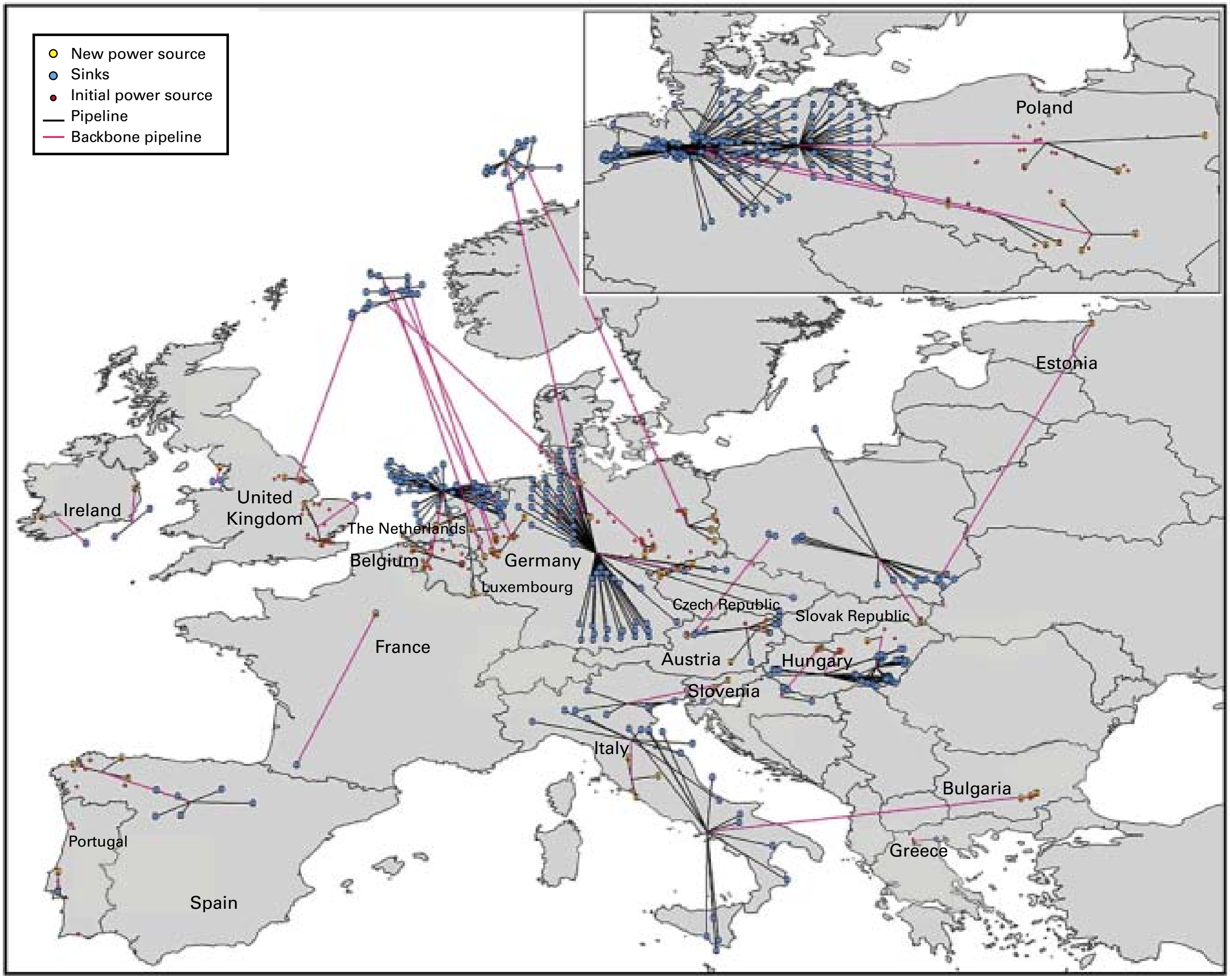
Another factor is the potential use of existing oil and gas transport infrastructure—pipelines, pumping and compressor stations, offshore platforms,



OIL&GAS JOURNAL Previous Page | Contents | Zoom In | Zoom Out | Front Cover | Search Issue | Next Page qMags

## $CO_2$ PIPELINES IN EUROPE; MEMBER STATES SCENARIO

Fig. 2




Source: Annex XIII of the European Commission Staff Working Document, "Accompanying document to the Proposal for a Directive of the European Parliament and of the Council on the Geological Storage of Carbon Dioxide – Impact Assessment," 2008.

etc.—for transporting captured $CO_2$. Although feasible in some regions, such as sections of the North Sea, most of any future $CO_2$ pipeline network will consist of new pipelines.

Timing the end of service of existing pipelines to the arrival of captured $CO_2$ will prove difficult. Important design differences exist between gas and $CO_2$ pipelines (pressure, corrosion protection, fracture arrestors, etc.). Infrastructure conversion investment will also be needed for pipeline refurbishment, pumping stations, platforms, etc.

### Development scenarios

An impact assessment document presented in January 2008 supported the EU CCS directive. The document assessed several possible European CCS development scenarios for 2020, 2025, and 2030[3] and their environmental, social, and economic effects.

The document assessed the three CCS elements—capture, transportation, and storage—separately, concluding that $CO_2$ pipelines have similar risks to those carrying natural gas and will thus be similarly regulated. Amended Directive 85/337/EC therefore requires $CO_2$ pipelines more than 40 km long with an OD >800 mm to provide an environmental impact assessment.

This article will focus on the two $CO_2$ pipeline network scenarios assessed by that impact assessment. In the first scenario (member states), each member state of the EU will store, as much as possible, $CO_2$ within its borders, creating hub-and-spoke pipeline networks with almost no cross-border interconnections. This scenario foresees just 560 km of $CO_2$ pipelines in 2025 and around 6,700 km in 2030, virtually all onshore (Fig. 1).

Since about three quarters of the $CO_2$ capture would happen in Germany, Poland, the UK, and Belgium, most pipelines would be built in those countries.

About 55% of the total length will be pipelines measuring less than 610-mm OD, with no $CO_2$ pipelines likely more than 900 mm OD.

The second scenario (pan-European) can transport $CO_2$ to storage areas in other countries, using the assumption that storage in depleted gas fields is more secure than storage in saline aquifers. This scenario would create a truly pan-European pipeline network, 8,080 km of pipelines in 2020, 18,700 km in 2025, and 45,580 km in 2030.

More than 80% of the 2030 network will be onshore pipelines (37,150 km), with the balance lying offshore in the North Sea, Baltic Sea, Irish Sea, and Mediterranean Sea (Fig. 2 and table).

Almost 60% of the pipelines will have an OD <610 mm, with the balance ≤900 mm. The EU gas transmission network measured about 110,000 km in 2001.

## Costs

Developing a cost simulation for the above scenarios requires understanding the main cost categories, as well as the expected cost differences between building new gas and new $CO_2$ pipelines. $CO_2$ pipeline infrastructure requires investment in two main categories: pipelines and other infrastructure (pumping stations, offshore platforms, etc.). The main pipeline infrastructure cost categories are labor costs and pipe and other material costs, followed by land, ROW, and other costs (OGJ, Sept. 14, 2009, p. 60).

Some costs will be different for $CO_2$ pipelines than for natural gas. Since $CO_2$ pipelines have a high-risk of aggressive internal corrosion from small water or $H_2S$ volumes, material costs will be higher. In most cases stainless steel will be used instead of the cheaper carbon steel, or a polyethylene liner will protect the carbon steel unless a corrosion inhibitor is added directly to the $CO_2$.

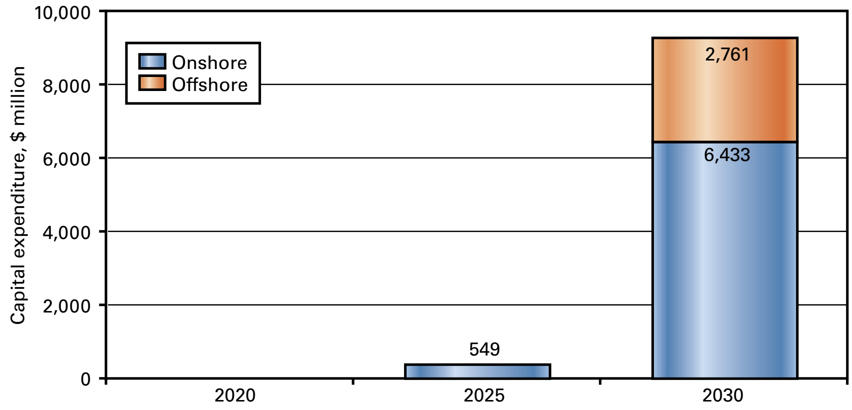
$CO_2$ pipelines also need fracture arrestors every 300-500 m to prevent longitudinal ductile fractures caused by the slow decompression of the carbon dioxide. To reduce transportation costs, $CO_2$ pipelines are also usually designed at higher operating pressures than gas pipelines, sometimes requiring a thicker pipe wall.

$CO_2$ pipelines need pumping stations instead of the compressor stations used for gas pipelines. Offshore pipelines need either subsea manifolds or standard platforms to receive the $CO_2$ before pumping it to injection wellheads (1-10/subsea manifold, 10-20/platform).

The pipeline cost estimate for onshore $CO_2$ pipelines uses a mix of cost assumptions for both gas and $CO_2$ pipelines drawn from the INGAA 2009 $CO_2$ pipeline assessment[4] and in the ECA/Penspen/EIHP 2007 study.[5] Cost estimates for the pumping stations, etc., used cost assumptions similar to those in the INGAA study.

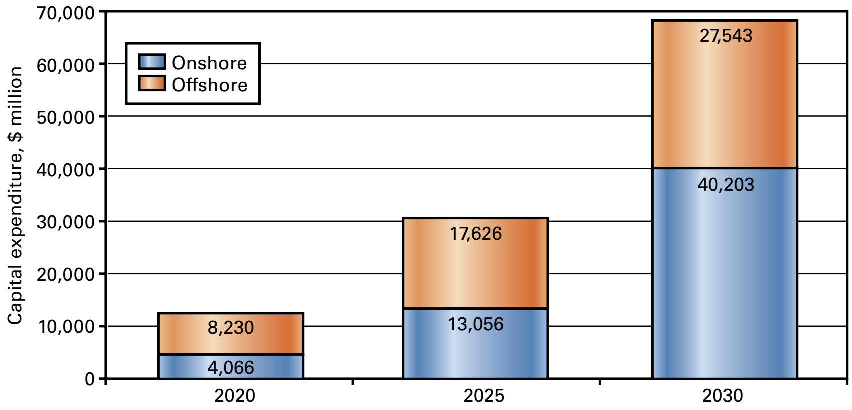
Offshore pipelines cost estimates used assumptions close to those used in the NOGEPA 2009 study,[2] while the costs for the other transport infrastructure—platforms, pumping stations—were estimated with the BERR 2008 study's[6] assumptions, particularly reuse of some existing North Sea platforms and limited use of $CO_2$ for enhanced hydrocarbon recovery.

CUMULATIVE $CO_2$ PIPELINE INVESTMENT IN EUROPE; MEMBER-STATES SCENARIO Fig. 3



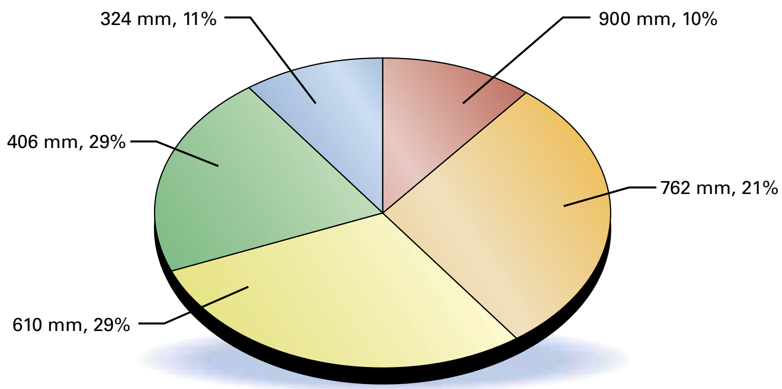

Source: Author estimates based on Annex VII of the European Commission Staff Working Document, "Accompanying Document tothe Proposal for a Directive of the European Parliament and Council on the Geological Storage of Carbon Dioxide – Impact Assessment," 2008.

CUMULATIVE $CO_2$ PIPELINE INVESTMENT IN EUROPE; EUROPEAN SCENARIO Fig. 4




Source: Author estimates based on Annex VII of the European Commission Staff Working Document, "Accompanying Document to the Proposal for a Directive of the European Parliament and Council on the Geological Storage of Carbon Dioxide – Impact Assessment," 2008.

**CUMULATIVE $CO_2$ PIPELINE INVESTMENT IN EUROPE; EUROPEAN SCENARIO BY OD** Fig. 5




Source: Author estimates based on Annex VII of the European Commission Staff Working Document, "Accompanying Document to the Proposal for a Directive of the European Parliament and Council on the Geological Storage of Carbon Dioxide – Impact Assessment," 2008.

Offshore $CO_2$ pipelines will be much more expensive than onshore $CO_2$ pipelines.

Under the member-state scenario, with each state storing its $CO_2$ emissions domestically, 70% of cumulative $CO_2$ pipeline investment by 2030 will be for onshore pipelines. Total EU estimated cumulative pipeline investment—pipeline and other transport infrastructure—will equal $550 million by 2025 and $9.2 billion by 2030 (Fig. 3).

Under the European scenario, with $CO_2$ storage optimized across Europe to take advantage of better storage areas (depleted oil and gas fields) and relatively interconnected national pipeline networks, only 60% of the cumulated $CO_2$ pipeline investment by 2030 will be for onshore pipelines, as offshore storage development will be greater. The estimated cumulative pipeline investment—including pipeline and other transport infrastructure—will total $12.3 billion by 2020, $30.7 billion by 2025, and $67.7 billion by 2030 (Fig. 4). Roughly 70% of the investment will go to pipelines ≤610 mm OD (Fig. 5).

Cumulative investment in onshore pipelines will reach $4.1 billion in 2020, $13.1 billion in 2025, and $40.2 billion in 2030, while cumulative investment for offshore pipelines will be $8.2 billion by 2020, $17.6 billion by 2025, and $27.5 billion by 2030.

Subjecting these cost estimates to further sensitivity analysis can account for fluctuations in the different cost categories, but this goes beyond the scope of this article: estimating an initial cost range for $CO_2$ transportation infrastructure.

Operating costs for pipeline networks under each scenario remain difficult to assess, with some cost categories, such as pipeline monitoring, still being discussed by the EU.

## First steps

Development of a European $CO_2$ pipeline network according to either of these scenarios could represent an excellent long-term business opportunity, generating revenue and employment for design companies, construction companies, and operating companies, as well as companies providing materials or services such as steel pipe mills, specialized coating companies, pipeline monitoring and inspection companies, etc. Using transported $CO_2$ for enhanced hydrocarbon recovery, although limited in application, could also help sustain declining oil and gas production in Europe.

Technological barriers and the high costs of $CO_2$ capture, however, have made large-scale adoption of CCS uncertain. Implementation of Directive 2009/31/EC into national laws could be slow as other priorities take priority, especially in the wake of the global economic crisis. The concentration of industrial $CO_2$ sources in a limited number of EU countries could also lead to imbalanced interest in developing CCS.

New national agencies have to be created to deal with permitting and monitoring carbon storage, operating pipelines, and managing open access to them. Financing mechanisms for building new $CO_2$ pipelines need to be identified. Lacking a $CO_2$ pipeline history, the EU must create the whole industry from scratch, including educating the public on the perceived and real risks of $CO_2$ pipelines.

Companies, industry associations, and national governments in Europe, however, are becoming increasingly proactive in supporting development of a European $CO_2$ transportation infrastructure. In parallel with the CCS demonstration projects already active or under developments in the UK, France, Germany, Italy, and Norway, $CO_2$ pipeline transportation corridors are being assessed and the first pilot pipelines are built.

Total will operate a 27-km $CO_2$ pipeline for its Lacq CCS project in France (OGJ, June 15, 2009, p. 9). Eni and Enel plan to move $CO_2$ captured at a power plant in Brindisi to a storage area in northern Italy. Gassco (Norway) has recently awarded 636 km of seabed survey to find the best pipeline corridors for future $CO_2$ pipelines linking power plants in Mongstad and Kaarsto to storage areas on the Norwegian continental shelf. The list of such initiatives continues to grow. ✦

## References

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EC, 2008/1/EC and Regulation (EC) No 1013/2006.

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4. Interstate Natural Gas Association of America (INGAA), "Developing a Pipeline Infrastructure for $CO_2$ Capture and Storage: Issues and Challenges," 2009.

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**The author**

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# Equipment/Software/Literature

## New metering system for tight gas reservoirs

The CARBONTRACKER gas metering system is a new development in reservoir characterization for tight gas, underbalanced drilling operations.

The meter is designed specifically for tight gas reservoirs and is accurate at flow velocities as low as 1 fps. Installed in the flare line between this firm's MUD/GAS SEPARATOR and the flare stack, the meter measures gas flow velocity, temperature, and pressure to determine actual and standard volumetric flow, as well as mass flow rates.

Rather than making decisions based only on log data to predict production, operators can find the location of productive gas zones while drilling underbalanced, the company points out.

The meter can be used on any rig, onshore or off. With no moving parts, it tolerates dirty or wet conditions and creates no obstructions in the flare line. The unit includes the flow cell that is installed in the flare line, a flow computer, and a housing to protect the electronic components.

Source: **M-I SWACO Pressure Control Group,** Box 42842, Houston, TX 77242-2842.

## Solar option addds portability to skimmer

Here's the new Oil Grabber Model 8 with a solar option that makes the unit portable.

The unit provides a continuous belt and wiper to remove as much 40 gph of oil from the fluid surface—and lets you "run with the sun." A 12-v motor powers the compact, self-contained unit. That motor runs off a deep-cycle battery, which in turn is recharged by an adjustable solar panel. It takes only a couple of hours to recharge the battery, the company notes.

Depending on the characteristics of the liquid, it is possible for the skimmer alone to reduce oil content to less than 5 ppm in water. The unit is used as a pretreatment before disposal, as well as in conjunction with coalescing systems and with systems where it prevents filters from blinding prematurely.

The unit can be used in tanks with depths as shallow as 1 ft or as deep as 100 ft.

Source: **Abanaki Corp., Skimmer Div.,** 17387 Munn Rd., Chagrin Falls, OH 44023.

# Services/Suppliers

## VAM Drilling,

Boulogne-Billancourt, France, has agreed to acquire Dubai-based DPAL FZCO from the Soconord Group. Terms of the agreement aren't disclosed. DPAL FZCO's plant in Dubai's Jebel Ali Free Zone offers a large range of drill pipe and has a capacity of 25,000 joints/year. The acquisition bolsters VAM's presence in the Middle East, providing local manufacturing for its major international customers operating in the region as well as local state-owned operating and drilling companies. The Middle East is a growing market for premium drilling pipe products.

VAM is a subsidiary of Vallourec, a world leader in the production of seamless steel tubes.

## FMC Technologies Inc.,

Houston, has agreed to acquire Multi Phase Meters AS (MPM), Stavanger, for an initial cash payment of $30 million and two earn-out payments based on 6.6 times 2012 and 2013 EBITDA (earnings before income tax, depreciation, and amortization). The deal is expected to close in the fourth quarter and be accretive in 2011.

FMC designs, manufactures, and services subsea production and processing systems, surface wellhead systems, high-pressure fluid control equipment, measurement solutions, and marine loading systems for the oil and gas industry.

MPM is a global leader in the development and manufacture of high-performance multiphase flow meters for the oil and gas industry.

## Intermoor do Brasil Servicos Offshore de Instalacao Ltda.,

Rio de Janeiro, has named Andre Pallares health, safety, and environment assistant. Pallares will be in charge of coordinating all HSE requirements for Brazil operations. Previously, he was technical assistant at Maersk Oil Brasil Ltda., and $H_2S$ supervisor trainee for Maersk $H_2S$ Safety Services. Pallares has experience in areas such as calibration, inspection, maintenance, and organization of personal protective equipment.

InterMoor, an Acteon company, is a leading supplier of mooring technology, providing solutions for rig moves, mooring services, and subsea foundations, including engineering and design, survey and positioning, fabrication, and subsea services.

## eLynx Technologies,

Tulsa, has opened a new field services and business development office in Lander, Wyo. The new office will serve Wyoming, Colorado, Montana, Utah, Idaho, North Dakota, South Dakota, and other western states. The Lander office will help support the company's expanding SCADALynx customer base in the Bakken shale and Uinta Basin.

eLynx provides real-time data collection, production reporting, trending, well monitoring, and control via the Internet for the oil and gas industry.

# Statistics

## Imports of crude and products

| | Districts 1-4 10-2 2009 | Districts 1-4 9-25 2009 | District 5 10-2 2009 | District 5 9-25 2009 | Total US 10-2 2009 | Total US 9-25 2009 | Total US *10-3 2008 |
|---|---|---|---|---|---|---|---|
| | 1,000 b/d | | | | | | |
| Total motor gasoline | 993 | 833 | 18 | 18 | 1,011 | 851 | 1,434 |
| Mo. gas. blending comp. | 910 | 620 | 11 | 14 | 921 | 634 | 958 |
| Distillate | 194 | 87 | 20 | 63 | 214 | 150 | 165 |
| Residual | 265 | 276 | 0 | 101 | 265 | 377 | 432 |
| Jet fuel-kerosine | 17 | 51 | 76 | 64 | 93 | 115 | 151 |
| Propane-propylene | 99 | 136 | 7 | 6 | 106 | 142 | 64 |
| Other | 201 | 266 | 91 | 159 | 292 | 425 | 641 |
| **Total products** | **2,679** | **2,269** | **223** | **425** | **2,902** | **2,694** | **3,845** |
| **Total crude** | **7,981** | **8,119** | **1,117** | **1,414** | **9,098** | **9,533** | **10,346** |
| **Total imports** | **10,660** | **10,388** | **1,340** | **1,839** | **12,000** | **12,227** | **14,191** |

*Revised.
Source: US Energy Information Administration
Data available in OGJ Online Research Center.

Additional analysis of market trends is available through **OGJ Online**, *Oil & Gas Journal's* electronic information source, at http://www.ogjonline.com.

OIL&GAS JOURNAL online research center.

## OGJ crack spread

| | *10-9-09 | *10-10-08 | Change | Change, % |
|---|---|---|---|---|
| | $/bbl | | | |
| **SPOT PRICES** | | | | |
| Product value | 74.94 | 92.56 | –17.62 | –19.0 |
| Brent crude | 67.81 | 82.02 | –14.21 | –17.3 |
| Crack spread | 7.13 | 10.54 | –3.41 | –32.3 |
| **FUTURES MARKET PRICES** | | | | |
| **One month** | | | | |
| Product value | 74.86 | 91.00 | –16.14 | –17.7 |
| Light sweet crude | 70.86 | 86.22 | –15.36 | –17.8 |
| Crack spread | 3.99 | 4.77 | –0.78 | –16.4 |
| **Six month** | | | | |
| Product value | 81.96 | 99.12 | –17.16 | –17.3 |
| Light sweet crude | 73.05 | 86.47 | –13.42 | –15.5 |
| Crack spread | 8.91 | 12.65 | –3.74 | –29.6 |

*Average for week ending.
Source: Oil & Gas Journal
Data available in OGJ Online Research Center.

## Purvin & Gertz LNG netbacks—Oct. 9, 2009

| Receiving terminal | Liquefaction plant Algeria | Malaysia | Nigeria | Austr. NW Shelf | Qatar | Trinidad |
|---|---|---|---|---|---|---|
| | $/MMbtu | | | | | |
| Barcelona | 5.74 | 4.10 | 5.33 | 4.00 | 4.66 | 5.26 |
| Everett | 3.08 | 1.10 | 2.74 | 1.20 | 1.61 | 3.35 |
| Isle of Grain | 3.97 | 1.95 | 3.37 | 1.85 | 2.48 | 3.39 |
| Lake Charles | 1.36 | 0.36 | 1.15 | 0.33 | 0.08 | 1.93 |
| Sodegaura | 4.85 | 7.11 | 5.11 | 6.74 | 6.04 | 4.21 |
| Zeebrugge | 5.60 | 3.58 | 5.08 | 3.47 | 4.17 | 5.14 |

Definitions, see OGJ Apr. 9, 2007, p. 57.
Source: Purvin & Gertz Inc.
Data available in OGJ Online Research Center.

## Crude and product stocks

| District | Crude oil | Motor gasoline Total | Motor gasoline Blending comp.[1] | Jet fuel, kerosine | Fuel oils Distillate | Fuel oils Residual | Propane–propylene |
|---|---|---|---|---|---|---|---|
| | 1,000 bbl | | | | | | |
| PADD 1 | 14,472 | 58,662 | 40,187 | 12,149 | 75,920 | 13,069 | 4,734 |
| PADD 2 | 76,753 | 50,736 | 24,698 | 8,019 | 33,358 | 1,105 | 31,318 |
| PADD 3 | 176,818 | 70,299 | 38,055 | 15,637 | 47,177 | 16,717 | 34,753 |
| PADD 4 | 15,429 | 6,289 | 2,012 | 580 | 3,355 | 225 | [1]2,229 |
| PADD 5 | 53,954 | 28,403 | 22,538 | 9,348 | 11,946 | 4,153 | — |
| **Oct. 2, 2009** | **337,426** | **214,389** | **127,490** | **45,733** | **171,756** | **35,269** | **73,034** |
| **Sept. 25, 2009** | **338,404** | **211,452** | **125,219** | **45,983** | **171,077** | **33,969** | **72,816** |
| **Oct. 3, 2008[2]** | **302,587** | **186,815** | **95,969** | **36,783** | **122,601** | **37,809** | **60,876** |

[1]Includes PADD 5. [2]Revised.
Source: US Energy Information Administration
Data available in OGJ Online Research Center.

## Refinery report—Oct. 2, 2009

| District | Refinery operations Gross inputs | Refinery operations Crude oil inputs | Refinery output Total motor gasoline | Jet fuel, kerosine | Fuel oils Distillate | Fuel oils Residual | Propane–propylene |
|---|---|---|---|---|---|---|---|
| | 1,000 b/d | | 1,000 b/d | | | | |
| PADD 1 | 1,470 | 1,396 | 2,477 | 79 | 436 | 86 | 57 |
| PADD 2 | 3,108 | 3,093 | 2,282 | 184 | 906 | 52 | 279 |
| PADD 3 | 7,192 | 7,048 | 2,901 | 657 | 2,046 | 377 | 696 |
| PADD 4 | 560 | 560 | 309 | 32 | 182 | 10 | [1]67 |
| PADD 5 | 2,690 | 2,510 | 1,448 | 394 | 472 | 148 | — |
| **Oct. 2, 2009** | **15,020** | **14,607** | **9,417** | **1,346** | **4,042** | **673** | **1,099** |
| **Sept. 25, 2009** | **14,921** | **14,591** | **9,098** | **1,346** | **3,937** | **633** | **1,030** |
| **Oct. 3, 2008[2]** | **14,251** | **14,024** | **8,936** | **1,435** | **4,029** | **581** | **1,025** |
| | **17,672 Operable capacity** | | **85.0 utilization rate** | | | | |

[1]Includes PADD 5. [2]Revised.
Source: US Energy Information Administration
Data available in OGJ Online Research Center.

## OGJ gasoline prices

| | Price ex tax 10-7-09 | Pump price* 10-7-09 | Pump price 10-8-08 |
|---|---|---|---|
| | ¢/gal | | |
| (Approx. prices for self-service unleaded gasoline) | | | |
| Atlanta | 190.9 | 237.4 | 358.0 |
| Baltimore | 196.5 | 238.4 | 362.4 |
| Boston | 198.5 | 240.4 | 358.1 |
| Buffalo | 191.5 | 252.4 | 353.0 |
| Miami | 204.8 | 256.4 | 355.0 |
| Newark | 197.7 | 230.3 | 348.0 |
| New York | 186.4 | 247.3 | 358.0 |
| Norfolk | 192.0 | 230.4 | 352.4 |
| Philadelphia | 196.7 | 247.4 | 360.1 |
| Pittsburgh | 195.9 | 246.6 | 323.7 |
| Wash., DC | 209.0 | 247.4 | 322.7 |
| PAD I avg | 196.4 | 243.1 | 350.1 |
| Chicago | 198.0 | 262.4 | 352.4 |
| Cleveland | 210.3 | 256.7 | 326.2 |
| Des Moines | 197.0 | 237.4 | 354.3 |
| Detroit | 203.0 | 262.4 | 359.7 |
| Indianapolis | 188.1 | 247.5 | 354.6 |
| Kansas City | 186.4 | 222.4 | 346.4 |
| Louisville | 206.3 | 247.2 | 365.0 |
| Memphis | 185.6 | 225.4 | 348.8 |
| Milwaukee | 198.1 | 249.4 | 359.7 |
| Minn.-St. Paul | 202.4 | 246.4 | 356.8 |
| Oklahoma City | 178.0 | 213.4 | 328.5 |
| Omaha | 175.0 | 220.3 | 330.7 |
| St. Louis | 181.4 | 217.4 | 345.7 |
| Tulsa | 175.0 | 210.4 | 336.6 |
| Wichita | 179.0 | 222.4 | 341.4 |
| PAD II avg | 190.9 | 236.1 | 347.1 |
| Albuquerque | 191.7 | 228.1 | 352.9 |
| Birmingham | 194.8 | 234.1 | 350.6 |
| Dallas-Fort Worth | 195.2 | 233.6 | 338.6 |
| Houston | 193.1 | 231.5 | 358.8 |
| Little Rock | 187.8 | 228.0 | 348.1 |
| New Orleans | 195.7 | 234.1 | 358.8 |
| San Antonio | 196.7 | 235.1 | 351.0 |
| PAD III avg | 193.6 | 232.1 | 351.3 |
| Cheyenne | 219.4 | 251.8 | 338.7 |
| Denver | 219.9 | 260.3 | 371.7 |
| Salt Lake City | 211.4 | 254.3 | 349.4 |
| PAD IV avg | 216.9 | 255.5 | 353.3 |
| Los Angeles | 235.2 | 302.3 | 361.6 |
| Phoenix | 225.8 | 263.2 | 348.2 |
| Portland | 240.9 | 284.3 | 353.2 |
| San Diego | 237.2 | 304.3 | 368.8 |
| San Francisco | 244.2 | 311.3 | 374.3 |
| Seattle | 242.4 | 298.3 | 358.3 |
| PAD V avg | 237.6 | 293.9 | 360.7 |
| **Week's avg.** | **201.3** | **246.9** | **351.0** |
| **Sept. avg.** | **211.0** | **256.6** | **367.2** |
| **Aug avg.** | **209.9** | **255.5** | **375.3** |
| **2009 to date** | **179.3** | **224.9** | — |
| **2008 to date** | **310.6** | **354.6** | — |

*Includes state and federal motor fuel taxes and state sales tax. Local governments may impose additional taxes.
Source: Oil & Gas Journal.
Data available in OGJ Online Research Center.

## Refined product prices

**Spot market product prices**

| | 10-2-09 ¢/gal | | 10-2-09 ¢/gal |
|---|---|---|---|
| Motor gasoline (Conventional-regular) | | Heating oil No. 2 | |
| New York Harbor | 175.05 | New York Harbor | 176.26 |
| Gulf Coast | 173.05 | Gulf Coast | 174.26 |
| Los Angeles | 184.05 | Gas oil | |
| Amsterdam-Rotterdam-Antwerp (ARA) | 167.84 | ARA | 177.29 |
| Singapore | 176.24 | Singapore | 174.52 |
| Motor gasoline (Reformulated-regular) | | Residual fuel oil | |
| New York Harbor | 172.55 | New York Harbor | 149.12 |
| Gulf Coast | 170.05 | Gulf Coast | 149.48 |
| Los Angeles | 196.05 | Los Angeles | 173.38 |
| | | ARA | 152.61 |
| | | Singapore | 157.03 |

Source: DOE Weekly Petroleum Status Report.
Data available in OGJ Online Research Center.

## Baker Hughes rig count

| | 10-9-09 | 10-10-08 |
|---|---|---|
| Alabama | 6 | 4 |
| Alaska | 6 | 9 |
| Arkansas | 39 | 56 |
| California | 22 | 45 |
| Land | 21 | 45 |
| Offshore | 1 | 0 |
| Colorado | 38 | 106 |
| Florida | 0 | 2 |
| Illinois | 0 | 1 |
| Indiana | 2 | 2 |
| Kansas | 25 | 12 |
| Kentucky | 11 | 12 |
| Louisiana | 159 | 197 |
| N. Land | 109 | 79 |
| S. Inland waters | 9 | 23 |
| S. Land | 12 | 32 |
| Offshore | 29 | 63 |
| Maryland | 0 | 0 |
| Michigan | 0 | 2 |
| Mississippi | 8 | 16 |
| Montana | 3 | 9 |
| Nebraska | 2 | 0 |
| New Mexico | 45 | 95 |
| New York | 3 | 8 |
| North Dakota | 48 | 74 |
| Ohio | 8 | 10 |
| Oklahoma | 76 | 205 |
| Pennsylvania | 56 | 22 |
| South Dakota | 0 | 1 |
| Texas | 396 | 935 |
| Offshore | 3 | 10 |
| Inland waters | 0 | 0 |
| Dist. 1 | 22 | 27 |
| Dist. 2 | 14 | 35 |
| Dist. 3 | 35 | 64 |
| Dist. 4 | 31 | 89 |
| Dist. 5 | 67 | 180 |
| Dist. 6 | 44 | 138 |
| Dist. 7B | 9 | 29 |
| Dist. 7C | 30 | 61 |
| Dist. 8 | 65 | 129 |
| Dist. 8A | 16 | 30 |
| Dist. 9 | 27 | 44 |
| Dist. 10 | 33 | 99 |
| Utah | 17 | 44 |
| West Virginia | 21 | 30 |
| Wyoming | 39 | 79 |
| Others—HI-1; NV-2; OR-1; TN-1; VA-5 | 11 | 14 |
| **Total US** | **1,041** | **1,990** |
| **Total Canada** | **239** | **470** |
| **Grand total** | **1,280** | **2,460** |
| US Oil rigs | 305 | 429 |
| US Gas rigs | 726 | 1,548 |
| Total US offshore | 33 | 78 |
| **Total US cum. avg. YTD** | **1,080** | **1,876** |

Rotary rigs from spudding in to total depth.
Definitions, see OGJ Sept. 18, 2006, p. 42.

Source: Baker Hughes Inc.
Data available in OGJ Online Research Center.

## Smith rig count

| Proposed depth, ft | 10-9-09 Rig count | 10-9-09 Percent footage* | 10-10-08 Rig count | 10-10-08 Percent footage* |
|---|---|---|---|---|
| 0-2,500 | 56 | 3.5 | 85 | 4.7 |
| 2,501-5,000 | 76 | 65.7 | 141 | 47.5 |
| 5,001-7,500 | 108 | 21.2 | 274 | 17.8 |
| 7,501-10,000 | 207 | 5.3 | 455 | 2.8 |
| 10,001-12,500 | 217 | 13.3 | 464 | 0.8 |
| 12,501-15,000 | 152 | 1.3 | 378 | 0.2 |
| 15,001-17,500 | 143 | — | 164 | — |
| 17,501-20,000 | 59 | — | 87 | — |
| 20,001-over | 31 | — | 31 | — |
| **Total** | **1,049** | **11.1** | **2,079** | **6.6** |
| INLAND | 17 | | 29 | |
| LAND | 998 | | 1,996 | |
| OFFSHORE | 34 | | 54 | |

*Rigs employed under footage contracts.
Definitions, see OGJ Sept. 18, 2006, p. 42.

Source: Smith International Inc.
Data available in OGJ Online Research Center.

## OGJ production report

| | [1]10-9-09 | [2]10-10-08 |
|---|---|---|
| | 1,000 b/d | |
| (Crude oil and lease condensate) | | |
| Alabama | 22 | 21 |
| Alaska | 678 | 688 |
| California | 656 | 655 |
| Colorado | 67 | 66 |
| Florida | 6 | 5 |
| Illinois | 27 | 27 |
| Kansas | 110 | 115 |
| Louisiana | 1,407 | 411 |
| Michigan | 17 | 18 |
| Mississippi | 63 | 60 |
| Montana | 85 | 86 |
| New Mexico | 165 | 159 |
| North Dakota | 200 | 193 |
| Oklahoma | 177 | 180 |
| Texas | 1,391 | 1,112 |
| Utah | 64 | 62 |
| Wyoming | 144 | 146 |
| All others | 65 | 73 |
| **Total** | **5,344** | **4,077** |

[1]OGJ estimate. [2]Revised.
Source: Oil & Gas Journal.
Data available in OGJ Online Research Center.

## US crude prices

| | 10-9-09 $/bbl* |
|---|---|
| Alaska-North Slope 27° | 65.67 |
| South Louisiana Sweet | 71.75 |
| California-Kern River 13° | 62.95 |
| Lost Hills 30° | 71.55 |
| Wyoming Sweet | 63.52 |
| East Texas Sweet | 67.75 |
| West Texas Sour 34° | 63.25 |
| West Texas Intermediate | 68.25 |
| Oklahoma Sweet | 68.25 |
| Texas Upper Gulf Coast | 61.25 |
| Michigan Sour | 60.25 |
| Kansas Common | 67.25 |
| North Dakota Sweet | 58.00 |

*Current major refiner's posted prices except North Slope lags 2 months. 40° gravity crude unless differing gravity is shown.

Source: Oil & Gas Journal.
Data available in OGJ Online Research Center.

## World crude prices

| $/bbl[1] | 10-2-09 |
|---|---|
| United Kingdom-Brent 38° | 65.45 |
| Russia-Urals 32° | 65.23 |
| Saudi Light 34° | 63.97 |
| Dubai Fateh 32° | 65.39 |
| Algeria Saharan 44° | 66.04 |
| Nigeria-Bonny Light 37° | 67.12 |
| Indonesia-Minas 34° | 67.93 |
| Venezuela-Tia Juana Light 31° | 65.59 |
| Mexico-Isthmus 33° | 65.48 |
| OPEC basket | 65.62 |
| Total OPEC[2] | 65.09 |
| Total non-OPEC[2] | 64.88 |
| Total world[2] | 65.00 |
| US imports[3] | 64.13 |

[1]Estimated contract prices. [2]Average price (FOB) weighted by estimated export volume. [3]Average price (FOB) weighted by estimated import volume.

Source: DOE Weekly Petroleum Status Report.
Data available in OGJ Online Research Center.

## US natural gas storage[1]

| | 10-2-09 | 9-25-09 | 10-3-08 | Change, % |
|---|---|---|---|---|
| | bcf | | | |
| Producing region | 1,169 | 1,145 | 862 | **35.6** |
| Consuming region east | 1,992 | 1,955 | 1,893 | **5.2** |
| Consuming region west | 497 | 489 | 431 | **15.3** |
| **Total US** | **3,658** | **3,589** | **3,186** | **14.8** |
| | July 09 | July 08 | Change, % | |
| **Total US[2]** | **3,086** | **2,516** | **22.7** | |

[1]Working gas. [2]At end of period.
Source: Energy Information Administration
Data available in OGJ Online Research Center.

# Statistics

## INTERNATIONAL RIG COUNT

| Region | Sept. 2009 Land | Sept. 2009 Off. | Sept. 2009 Total | Sept. 08 Total |
|---|---|---|---|---|
| **WESTERN HEMISPHERE** | | | | |
| Argentina | 52 | — | 52 | 84 |
| Bolivia | 4 | — | 4 | 4 |
| Brazil | 29 | 34 | 63 | 58 |
| Canada | 206 | 2 | 208 | 435 |
| Chile | 3 | — | 3 | 3 |
| Colombia | 27 | — | 27 | 41 |
| Ecuador | 10 | — | 10 | 14 |
| Mexico | 104 | 26 | 130 | 102 |
| Peru | 5 | 2 | 7 | 8 |
| Trinidad | — | 2 | 2 | 5 |
| United States | 976 | 33 | 1,009 | 2,014 |
| Venezuela | 46 | 10 | 56 | 78 |
| Other | 1 | — | 1 | 1 |
| **Subtotal** | **1,464** | **108** | **1,572** | **2,848** |
| **ASIA-PACIFIC** | | | | |
| Australia | 6 | 7 | 13 | 32 |
| Brunei | 1 | 1 | 2 | 4 |
| China-offshore | — | 21 | 21 | 20 |
| India | 63 | 31 | 94 | 76 |
| Indonesia | 46 | 12 | 58 | 60 |
| Japan | 3 | — | 3 | 3 |
| Malaysia | — | 17 | 17 | 14 |
| Myanmar | 3 | 1 | 4 | 5 |
| New Zealand | 3 | 1 | 4 | 6 |
| Papua New Guinea | 2 | — | 2 | 3 |
| Philippines | 5 | 1 | 6 | 4 |
| Taiwan | — | — | — | — |
| Thailand | 5 | 10 | 15 | 13 |
| Vietnam | — | 7 | 7 | 8 |
| Other | — | — | — | 4 |
| **Subtotal** | **137** | **109** | **246** | **252** |
| **AFRICA** | | | | |
| Algeria | 25 | — | 25 | 26 |
| Angola | — | 4 | 4 | 4 |
| Congo | 1 | — | 1 | 3 |
| Gabon | 0 | — | 0 | 2 |
| Kenya | 0 | — | — | — |
| Libya | 12 | 2 | 14 | 16 |
| Nigeria | 1 | 5 | 6 | 7 |
| South Africa | — | — | — | — |
| Tunisia | — | 3 | 3 | 4 |
| Other | 3 | 1 | 4 | 6 |
| **Subtotal** | **42** | **15** | **57** | **68** |
| **MIDDLE EAST** | | | | |
| Abu Dhabi | 8 | 4 | 12 | 11 |
| Dubai | — | 1 | 1 | 2 |
| Egypt | 34 | 10 | 44 | 64 |
| Iran | — | — | — | — |
| Iraq | — | — | — | — |
| Jordan | — | — | — | 2 |
| Kuwait | 16 | — | 16 | 12 |
| Oman | 46 | — | 46 | 54 |
| Pakistan | 20 | — | 20 | 23 |
| Qatar | 1 | 7 | 8 | 11 |
| Saudi Arabia | 55 | 10 | 65 | 76 |
| Sudan | — | — | — | — |
| Syria | 24 | — | 24 | 20 |
| Yemen | 7 | — | 7 | 15 |
| Other | 2 | — | 2 | 1 |
| **Subtotal** | **213** | **32** | **245** | **291** |
| **EUROPE** | | | | |
| Croatia | — | — | — | — |
| Denmark | — | 2 | 2 | 2 |
| France | — | — | — | — |
| Germany | 7 | — | 7 | 11 |
| Hungary | 2 | 1 | 3 | 5 |
| Italy | 1 | 1 | 2 | 4 |
| Netherlands | 3 | 2 | 5 | 3 |
| Norway | — | 22 | 22 | 21 |
| Poland | 3 | — | 3 | — |
| Romania | 8 | — | 8 | 18 |
| Turkey | 6 | — | 6 | 6 |
| UK | 2 | 17 | 19 | 22 |
| Other | 6 | — | 6 | 7 |
| **Subtotal** | **38** | **45** | **83** | **99** |
| **Total** | **1,894** | **309** | **2,203** | **3,558** |

Definitions, see OGJ Sept. 18, 2006, p. 42.
Source: Baker Hughes Inc.
Data available in OGJ Online Research Center.

## OIL IMPORT FREIGHT COSTS*

| Source | Discharge | Cargo | Cargo size, 1,000 bbl | Freight (Spot rate) worldscale | $/bbl |
|---|---|---|---|---|---|
| Caribbean | New York | Dist. | 200 | 91 | 1.04 |
| Caribbean | Houston | Resid. | 380 | 75 | 0.96 |
| Caribbean | Houston | Resid. | 500 | 67 | 0.87 |
| N. Europe | New York | Dist. | 200 | 110 | 2.03 |
| N. Europe | Houston | Crude | 400 | 78 | 2.09 |
| W. Africa | Houston | Crude | 910 | 57 | 1.76 |
| Persian Gulf | Houston | Crude | 1,900 | 26 | 1.51 |
| W. Africa | N. Europe | Crude | 910 | 57 | 1.30 |
| Persian Gulf | N. Europe | Crude | 1,900 | -- | -- |
| Persian Gulf | Japan | Crude | 1,750 | 36 | 1.20 |

*Sept. 2009 average.
Source: Drewry Shipping Consultants Ltd. Data available in OGJ Online Research Center.

## WATERBORNE ENERGY INC. US LNG IMPORTS

| Country | Aug. 2009 | July 2009 | Aug 2008 | Change from a year ago, % |
|---|---|---|---|---|
| | MMcf | | | |
| Algeria | 0 | 0 | 0 | — |
| Egypt | 20,280 | 20,140 | 3,000 | 576.0 |
| Equatorial Guinea | 0 | 0 | 0 | — |
| Nigeria | 2,930 | 2,930 | 0 | — |
| Norway | 0 | 5,770 | 0 | — |
| Qatar | 0 | 0 | 0 | — |
| Trinidad and Tobago | 22,540 | 15,290 | 30,800 | -26.8 |
| **Total** | **45,750** | **44,130** | **33,800** | **35.4** |

Source: Waterborne Energy Inc.
Data available in OGJ Online Research Center.
Data not available at press time.

## PROPANE PRICES

| | Aug. 2009 | Sept. 2009 | Aug. 2008 | Sept. 2008 |
|---|---|---|---|---|
| | ¢/gal | | | |
| Mont Belvieu | 90.57 | 94.64 | 165.09 | 153.00 |
| Conway | 64.80 | 84.33 | 158.42 | 149.72 |
| Northwest Europe | 89.22 | 100.25 | 162.61 | 162.01 |

Source: EIA Weekly Petroleum Status Report
Data available in OGJ Online Research Center.

## MUSE, STANCIL & CO. REFINING MARGINS

| | US Gulf Coast | US East Coast | US Mid-west | US West Coast | North-west Europe | South-east Asia |
|---|---|---|---|---|---|---|
| | $/bbl | | | | | |
| **Sept. 2009** | | | | | | |
| Product revenues | 77.54 | 73.83 | 76.56 | 80.96 | 74.40 | 72.37 |
| Feedstock costs | –72.98 | –70.40 | –68.53 | –66.58 | –69.11 | –69.75 |
| Gross margin | 4.56 | 3.43 | 8.03 | 14.38 | 5.29 | 2.62 |
| Fixed costs | –2.14 | –2.48 | –2.41 | –2.82 | –2.41 | –1.88 |
| Variable costs | –1.26 | –0.99 | –1.16 | –1.99 | –3.11 | –0.95 |
| **Cash operating margin** | **1.16** | **–0.04** | **4.46** | **9.57** | **–0.23** | **–0.21** |
| August 2009 | 3.90 | 2.91 | 6.61 | 11.37 | –0.19 | –1.82 |
| YTD avg. | 3.68 | 1.58 | 6.41 | 11.68 | 1.72 | –0.23 |
| 2008 avg. | 9.09 | 3.04 | 11.53 | 13.16 | 6.35 | 3.07 |
| 2007 avg. | 12.60 | 6.65 | 18.66 | 20.71 | 5.75 | 2.25 |
| 2006 avg. | 12.54 | 6.38 | 14.97 | 23.64 | 5.88 | 0.90 |

Source: Muse, Stancil & Co. See OGJ, Jan. 15, 2001, p. 46
Data available in OGJ Online Research Center.

## MUSE, STANCIL & CO. GASOLINE MARKETING MARGINS

| August 2009 | Chicago* | Houston | Los Angeles | New York |
|---|---|---|---|---|
| | ¢/gal | | | |
| Retail price | 273.59 | 256.32 | 302.55 | 278.69 |
| Taxes | 54.99 | 38.40 | 59.72 | 50.42 |
| Wholesale price | 204.89 | 200.54 | 227.38 | 213.50 |
| Spot price | 192.84 | 188.24 | 209.41 | 201.15 |
| Retail margin | 13.70 | 17.38 | 15.45 | 14.77 |
| Wholesale margin | 12.05 | 12.30 | 17.97 | 12.35 |
| **Gross marketing margin** | **25.75** | **29.68** | **33.42** | **27.12** |
| July 2009 | 32.74 | 33.71 | 40.13 | 42.34 |
| YTD avg. | 22.89 | 22.24 | 20.11 | 27.70 |
| 2008 avg. | 33.11 | 32.15 | 27.22 | 41.81 |
| 2007 avg. | 26.96 | 23.12 | 19.05 | 31.10 |
| 2006 avg. | 19.74 | 19.94 | 18.03 | 27.90 |

*The wholesale price shown for Chicago is the RFG price utilized for the wholesale margin. The Chicago retail margin includes a weighted average of RFG and conventional wholesale purchases.
Source: Muse, Stancil & Co. See OGJ, Oct. 15, 2001, p. 46.
Data available in OGJ Online Research Center.
Note: Margins include ethanol blending in all markets.

## MUSE, STANCIL & CO. ETHYLENE MARGINS

| | Ethane | Propane | Naphtha |
|---|---|---|---|
| | ¢/lb ethylene | | |
| **Sept. 2009** | | | |
| Product revenues | 43.23 | 75.51 | 97.00 |
| Feedstock costs | –20.57 | –54.36 | –89.99 |
| Gross margin | 22.66 | 21.15 | 7.01 |
| Fixed costs | –5.38 | –6.36 | –7.19 |
| Variable costs | –2.53 | –2.90 | –3.73 |
| **Cash operating margin** | **14.75** | **11.89** | **–3.91** |
| August 2009 | 14.65 | 11.84 | –15.12 |
| YTD avg. | 14.20 | 10.96 | –12.97 |
| 2008 avg. | 21.00 | 22.89 | –5.91 |
| 2007 avg. | 14.41 | 14.14 | –7.42 |
| 2006 avg. | 19.54 | 22.45 | 1.36 |

Source: Muse, Stancil & Co. See OGJ, Sept. 16, 2002, p. 46.
Data available in OGJ Online Research Center.

## MUSE, STANCIL & CO. US GAS PROCESSING MARGINS

| Sept. 2009 | Gulf Coast | Mid-continent |
|---|---|---|
| | $/Mcf | |
| Gross revenue | | |
| Gas | 2.77 | 2.52 |
| Liquids | 0.97 | 2.49 |
| Gas purchase cost | 3.08 | 3.38 |
| Operating costs | 0.07 | 0.15 |
| **Cash operating margin** | **0.60** | **1.48** |
| August 2009 | 0.56 | 1.08 |
| YTD avg. | 0.33 | 0.94 |
| 2008 avg. | 0.45 | 1.61 |
| 2007 avg. | 0.44 | 1.47 |
| 2006 avg. | 0.26 | 0.97 |
| Breakeven producer payment, % of liquids | 36% | 38% |

Source: Muse, Stancil & Co. See OGJ, May 21, 2001, p. 54.
Data available in OGJ Online Research Center.

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From the Subscribers Only area of OIL&GAS JOURNAL online www.ogjonline.com

## Tradeoff on climate bill might fracture oil and gas industry

The Editor's Perspective

by Bob Tippee, Editor

*Compromise forming around climate-change legislation in the US Senate promises despair for the oil and gas industry.*

*Senate Democrats have signaled their willingness to consider expansion of federal oil and gas leasing to secure support for cap-and-trade legislation. Proposed late last month by Barbara Boxer (D-Calif.) and John Kerry (D-Mass.), the legislation sets targets for greenhouse gas emissions that are tougher than those in a cap-and-trade bill passed by the House in June.*

*But it glosses over the crucial question of emission-credit allowances, which House-bill sponsors Henry Waxman (D-Calif.) and Ed Markey (D-Mass.) incorporated to overcome business opposition.*

*If the Senate bill passed, reconciliation with the House measure would become a high-dollar competition for allowances and other favors.*

*The oil and gas industry could hope only to limit damage.*

*In the House bill, which makes refiners responsible for their customers' emissions as well as their own, damage is extreme.*

*The American Petroleum Institute estimates the measure would force the refining industry to make or pay for 44% of total required emission cuts yet allow it only 2.5% of available credits.*

*To expect meaningfully better treatment of refiners on the Senate floor or in conference would be dangerously hopeful.*

*As presented, the Boxer-Kerry bill faces probable defeat in the full Senate because of its costs. But some opponents say they might back the legislation if it contained support for nuclear energy and new oil and gas leasing.*

*The industry should resist the tradeoff.*

*Politically inspired side deals steer attention away from two core cap-and-trade drawbacks: that the framework invites corruption and obscures increases in energy costs.*

*Furthermore, expanded access to federally owned hydrocarbon resources has merit by itself and never should have to come at the expense of refiners' health.*

*The compromise under discussion also has the potential to divide producers from refiners and independent refiners from their integrated counterparts.*

*A fracturing like that would be regrettable. A united industry speaks more coherently and exerts more influence than a splintered one. In the confused politics of the day, the oil and gas industry needs all the influence it can muster.*

*(Online Oct. 9, 2009; author's e-mail: bobt@ogjonline.com)*

Market Journal

by Sam Fletcher, Senior Writer

## EIA adopts new methodology

The US Energy Information Administration has adopted a new methodology to show high and low ranges in forecasts of oil and natural gas prices, as revealed in the October issue of its Short Term Energy Outlook (STEO).

Rather than continuing the use of variables such as inventories, gross domestic product, weather, OPEC's spare production capacity, and non-OPEC output, EIA now derives confidence intervals around expected futures prices using the "implied volatilities" of benchmark oil and gas options markets on NYMEX.

"The EIA believes that this methodology represents a market-cleared estimate of risks, i.e., a buyer and seller have agreed on the value of an option," said Adam Sieminski, chief energy economist, Deutsche Bank, Washington, DC, in an Oct. 9 report. The advantage over using historical volatilities, EIA said, is that it assesses future price uncertainty based directly on current market data and the expectations of "highly informed" market participants. The same system is used to assess market uncertainty by the US Federal Reserve Board and the Bank of England.

### Price outlooks

EIA expects West Texas Intermediate to average $70/bbl over this year's last quarter and into first-quarter 2010 before rising gradually to $75/bbl by yearend 2010 as US and world economic conditions improve. "We believe prices will be somewhat stronger in the near term as recovering economy and short-term weakness in the US dollar hold prices closer to $75/bbl over the fourth quarter and first quarter," said Sieminski. "However, the potential for some world economic setbacks in mid-2010 encourages us to maintain a below-consensus outlook for the second half of 2010 when we believe oil price could sink toward $60/bbl. We retain the view that 2011 oil prices will average $80/bbl, a price we feel is more in line with extraction costs."

EIA's confidence band around its gas prices forecasts is based on implied volatilities for the Henry Hub gas options on NYMEX. "EIA's spot prices in the recently published STEO are $1/MMbtu lower than the NYMEX futures strip," Sieminski said. "This difference reflects EIA's expectation that a significant volume of natural gas production remains economic at prices below the current NYMEX 2010 futures prices." He said EIA expects gas demand in the power industry—a crucial outlet for high gas supplies this year—to be limited in 2010 as prices move slightly higher and new coal-fired power generation capacity comes on line.

EIA forecast the Henry Hub spot price will average $5/MMbtu in 2010. "Our view is more in line with the NYMEX curve," said Sieminski. "We expect gas prices to average $4.75/MMbtu in the fourth quarter, rising to a $6/MMbtu average in 2010. We have maintained our 2011 estimate of $8/MMbtu because we believe the combination of lower supply and a recovered economy will allow the market to tighten significantly. Our $6/MMbtu gas price forecast for 2010 is still low enough, in our view, to support gas consumption growth in the key industrial and electric utility markets." The November gas contract closed at $4.96/MMbtu on Oct. 8, which was "high enough to discourage some storage activity," he said.

### Iran's ties to South America

While confronting Iran's nuclear program, the administration of US President Barack Obama also should address that country's growing influence and connections with anti-US regimes in Latin America, warned a security and economic expert in a recent opinion piece in The Atlanta Journal-Constitution.

Expansion of Iranian influence in the Western Hemisphere—diplomatic, economic, military, and terrorist infrastructure—has been rapid in the last 2 years, said Roman D. Ortiz, senior associate in the security and defense consulting firm Grupo Triarius and a professor at the School of Economy at Los Andes University in Bogota. He also reports a substantial increase in Iranian Revolutionary Guards (IRG) and their terrorist Hezbollah colleagues from Lebanon, with the IRG in close cooperation with Venezuelan intelligence agencies.

"The radical leftist governments of Venezuela, Bolivia, Ecuador, and Nicaragua view Iran as a partner with whom they share common ground: hostility towards the US. The result is an anti-American alliance in the heart of the Western Hemisphere," Ortiz warned. Tehran hopes the threat of terrorist retaliation from Latin America will discourage the US and Israel from attacks against Iran's nuclear infrastructure. Its goal is to shift US attention to the Western Hemisphere from the Middle East, said Ortiz.

(Online Oct. 12, 2009; author's e-mail: samf@ogjonline.com)


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# LAGCOE

Louisiana Gulf Coast Oil Exposition

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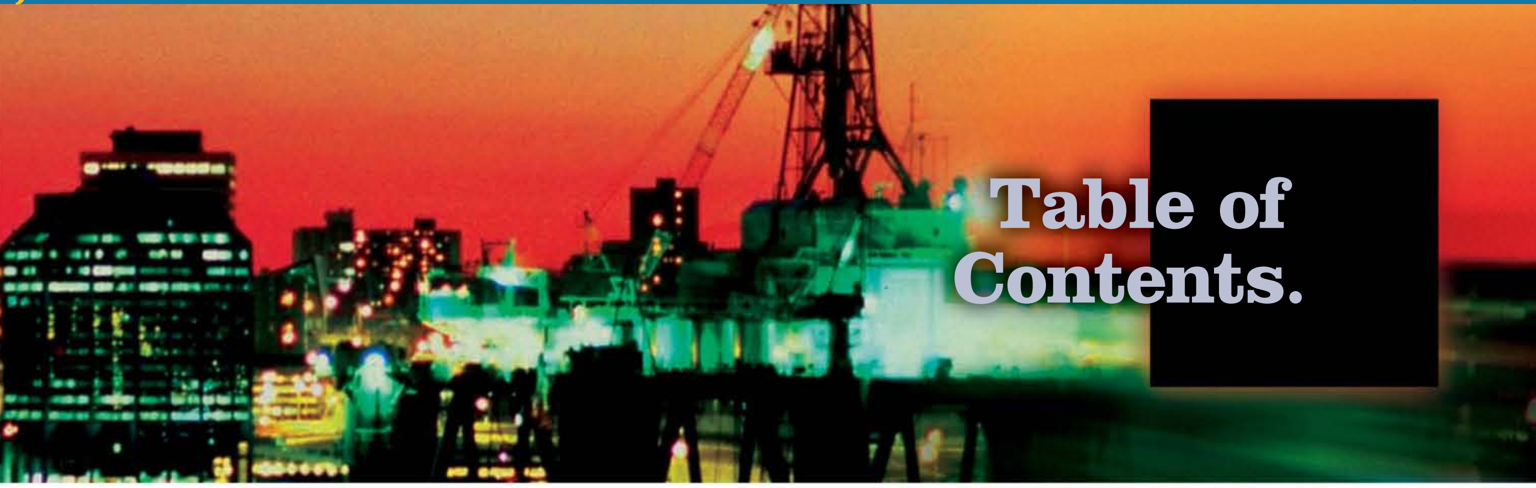

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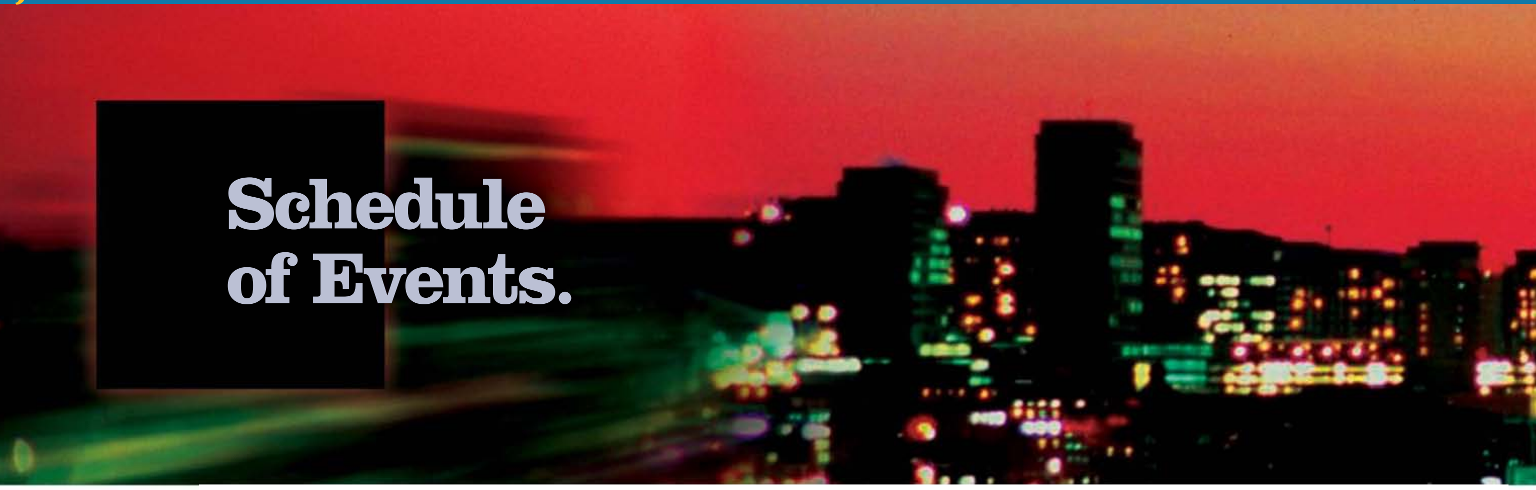
## Exhibits



LAGCOE

Louisiana Gulf Coast Oil Exposition



# Schedule of Events.

## TUESDAY, OCTOBER 27

| | |
|---|---|
| **9:00 a.m.** | Official Opening of Exposition to Industry Personnel Only |
| **10:00 a.m. - 11:30 a.m.** | Technical Presentation – "World Class Opportunities" |
| **1:00 p.m. - 2:00 p.m.** | Keynote Address – James (Jim) Flores, *Chairman, President, and CEO of Plains Exploration & Production* |
| **2:30 p.m. - 3:30 p.m.** | Technical Presentation – "LAGCOE Spotlight on New Technology" |
| **3:30 p.m. - 4:30 p.m.** | International Presentation |
| **5:00 p.m.** | Show Site Closes |

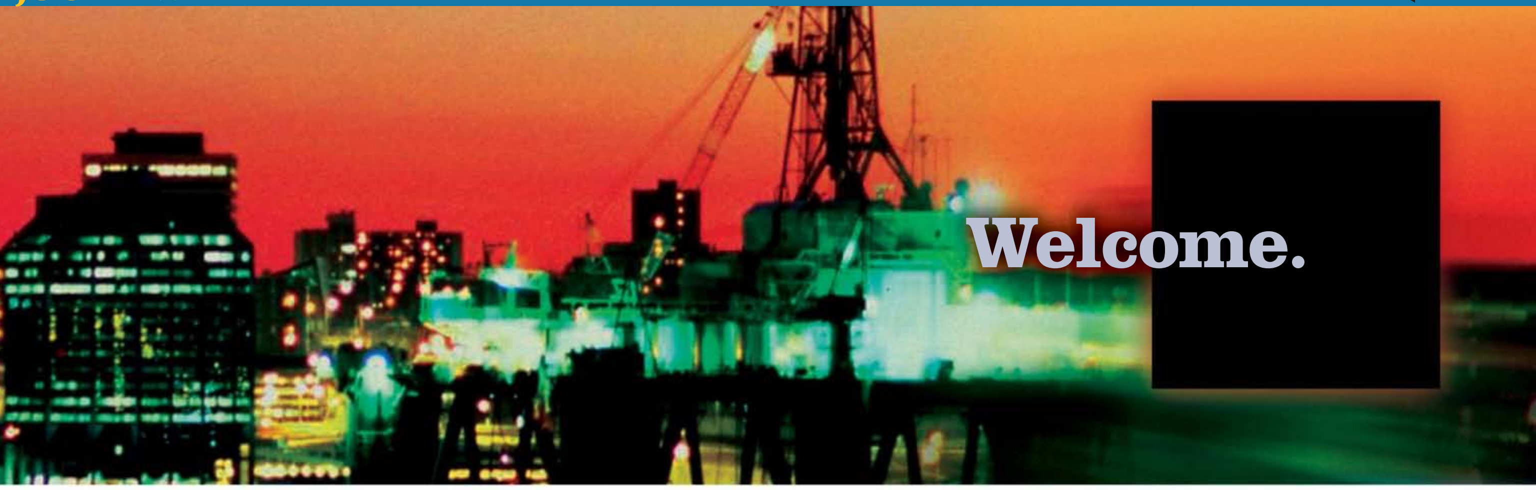
## WEDNESDAY, OCTOBER 28

| | |
|---|---|
| **9:00 a.m.** | Exposition Open to Industry Personnel Only |
| **10:00 a.m. - 11:30 a.m.** | International Presentation |
| **1:00 p.m. - 2:00 p.m.** | Keynote Address – Dr. Michael J. Economides, *Economist, Author and Professor at the University of Houston* |
| **2:30 p.m. - 3:30 p.m.** | Technical Presentation – "Unconventional Gas Resource Plays" |
| **3:30 p.m. - 4:30 p.m** | International Presentation |
| **5:00 p.m.** | Show Site Closes |

## THURSDAY, OCTOBER 29

| | |
|---|---|
| **9:00 a.m.** | Exposition Open to Industry Personnel Only |
| **12:00 p.m.** | Shrimp Boil on show grounds |
| **12:00 p.m.** | Exposition Opens to Public |
| **2:00 p.m.** | 2009 Louisiana Gulf Coast Oil Exposition Closes |

**All Technical Presentations** and **Keynote Addresses** will take place in the **Convention Center, Festival Ballroom.**



# Welcome.

## Letter from the Chairman and Chairman-elect

Welcome to LAGCOE 2009. On behalf of the LAGCOE Executive Committee, Board of Directors, and volunteers, thank you for your attendance at our event. Our Exposition is truly a unique event where industry leaders exhibit the latest in equipment and technology and target key issues affecting the oil & gas industry through our technical sessions.

Our 27th industry showcase promises to be a great success and unparalleled business opportunity. Held biennially at the Cajundome and Convention Center in Lafayette, LA, our event is hosted by over 200 industry volunteers and consistently attracts 16,000 attendees, including major decision makers from all across the Gulf Coast, to view featured exhibits by nearly 400 leading companies.

Since our first show in 1955, LAGCOE has evolved much like the oil and gas industry. Originally an exhibition focused primarily on the Louisiana Gulf Coast, today we are one of the two largest petroleum industry conferences in the nation, attracting international attention.

LAGCOE has once again been selected to participate as a U.S. Department of Commerce "International Buyer Program" event. Through this program, the U.S. Commercial Service, located in U.S. Embassies and Consulates around the world and particularly in key oil producing countries, have promoted LAGCOE to foreign government officials and industry business people. As a result of this promotion, LAGCOE is once again hosting a large group of international visitors from approximately 20 countries. These international business people will be visiting with LAGCOE exhibitors to purchase equipment and/or learn about the latest technology available to the industry for upcoming work in their respective countries.

Just as the energy industry is constantly advancing to meet new challenges and demands, LAGCOE exhibits and technical sessions are designed to support bold, innovative approaches in the quest for energy.

Our exhibits offer the most advanced technology for pursuing organizational goals. The products and services showcased here are cutting edge—the high tech tools of the 21st century. LAGCOE technical sessions are designed to offer solutions for the challenges of today's oil and gas environment where new technologies and approaches are critical to enhancing production and minimizing costs.

Finally, we want to thank the hundreds of volunteers who rolled up their sleeves and did whatever was necessary to make this a great show. We especially acknowledge Event Manager Sally Ware, Angela Cring, and our other hard-working professional staff for playing a vital role in the success of this event.

Again, welcome to LAGCOE 2009. All of us are at your service. We want to make this an exposition you'll remember for a long time to come, so call on us if we can assist you in any way.

Regards,

**Howard Wilson**
LAGCOE Chairman

**Larry Lemarie'**
LAGCOE Chairman-Elect



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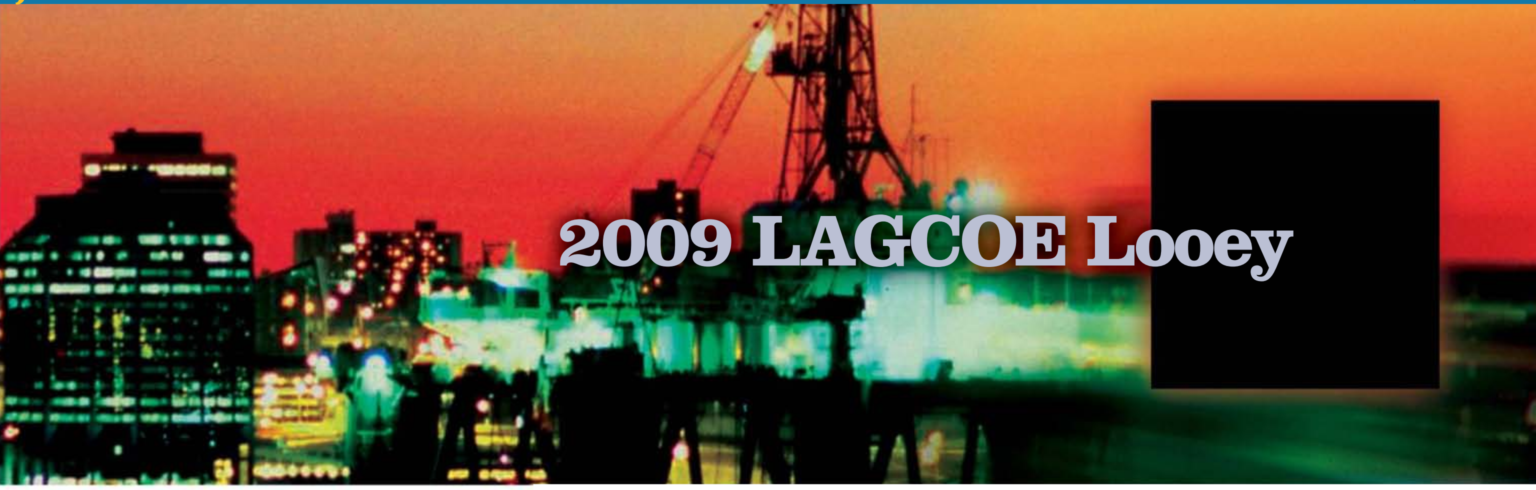

# 2009 LAGCOE Looey

LAGCOE honors **Frank W. Harrison, Jr.**, for the significant role he has played in the industry's growth and progress.

Frank W. Harrison, Jr. was born in Bastrop, Louisiana, where his father was employed by Union Producing Company as an area production and drilling supervisor. After completing his primary and secondary education in Bastrop, his family ties to the petroleum industry influenced Frank to enter Louisiana State University to study geology. Frank's accomplishments at LSU included being a Cadet Colonel in the ROTC and student president of the college of Arts and Sciences. Frank graduated from LSU in petroleum geology in 1951. Frank joined the Union Producing Company in Jackson, Mississippi in 1951. Soon after this event Frank's professional life was interrupted by military service in Korea where he served as a field artillery officer and as a staff officer.

Upon returning from the military, Frank was assigned to New Orleans where for the next three years he gained valuable experience as an oil scout, well sitting and conducting subsurface studies along the Miocene trend of coastal Louisiana. The last two years were spent with Seaboard Oil Company. In 1956 Frank moved to Lafayette, Louisiana, as district geologist for TransTex Drilling Company, a subsidiary of Husky Oil Company. Following this employment he served as head geologist for American Natural Gas Production Company.

In 1959 Frank became an independent and consultant in Lafayette and entered into a partnership with Jack Martin which prospered in the search for oil and gas in South Louisiana. In 1982 Frank formed South Louisiana Ventures, an exploration company staffed to originate prospects and to conduct leasing and drilling operations. Later, he established Optimistic Oil Company in 1990.

During Frank's tenure as an independent geologist, his exploration efforts have been very successful in finding resources through new field discoveries and extensions. Frank participated in the discovery and development of the Johnson Bayou Field, the Maurice Field, the Bunchy Creek Field, and the Beaver Dam Creek Field. In addition, he participated in the extension with Jack Martin in the Deep Lake Field, the Section 28 Field and numerous other significant extensions in South Louisiana. One of Frank's unique attributes is his ability to pursue, with equal energy and client integrity, both consulting work and a program directed at finding oil and gas. His consulting activities have always been an important and satisfying part of his professional life. This is particularly applicable to his continued involvement as a unitization expert. Although he has limited his practice, he continues to appear before the State Conservation Commissioner as an expert witness and has gained recognition in this field as one of the select few geologists automatically sought after when regulatory unitization is necessary. Frank's client list includes a number of the larger independents and major oil companies operating in Louisiana.

Throughout Frank's career as a practicing geologist he has almost continuously been involved with professional societies and worthwhile organizations for whom he has assumed various positions of leadership. The culmination of these honors was his election to the presidency of the American Association of Petroleum Geologists for the term 1981-1982. Other professional organizations where he has served as president are the Lafayette Geological Society, the Gulf Coast Association of Geological Societies, the American Geological Institute and the Louisiana Association of Independent Producers and Royalty Owners Association (now LOGA). He is also a recipient of the AAPG's coveted Honorary Member award.

**LAGCOE Looey *continued* on page 8**



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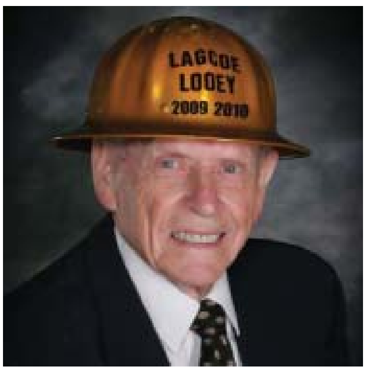
# 2009 LAGCOE Looey

LAGCOE Looey *continued* from page 7

He is certified as a professional geologist by the AAPG's Division of Professional Affairs and is a member of the American Institute of Professional Geologists, the Society of Independent Professional Earth Scientists and the Geological Society of America.

Through the years Frank has given equal time to the technical side of his profession by writing and presenting some 15 papers to a number of societies and geological groups nationwide. Of particular interest to South Louisiana geologists was The Camerina and Cibicides hazzardi Stratigraphic Interval. Frank was chairman of the group which prepared this sub-regional paper which received the best paper award at the 1962 GCAGS convention in New Orleans. Frank has given five timely papers on the Tuscaloosa trend having maintained a personal involvement in Tuscaloosa exploration and production since Chevron's discovery at False River in 1978.




**Frank W. Harrison, Jr.**

Frank's non-geological accomplishments are equally impressive and set an example that would be most difficult for any individual to attain. He has appeared as an oil industry spokesman on a number of local television programs as well as having participated in informative visits over the years to legislators and officials in Washington. As a civic minded citizen, he has chaired the Lafayette United Givers Fund, served two terms of three years each on the Lafayette Chamber of Commerce Board of Directors, and has been the recipient of a city-wide outstanding citizen award. In the private sector he has served on the board of directors of a bank, a public utility, an insurance company and on the Board of Trustees for the Lafayette General Medical Center.

In addition to serving for fifteen years on the advisory board of the Salvation Army, Frank has been very active in the Methodist Church having served in all positions of responsibility available to laymen. His outstanding achievement, however, is teaching his Sunday school class continuously for the past thirty years. A faithful alumni, Frank is a charter member of the Geology Advisory Council and a past member of the Louisiana State University Foundation.

Frank and his wife Pat have two children Patti Ann and Frank W. (Billy) Harrison, III. Both followed the family heritage by graduating from Louisiana State University. Billy is now a partner in Houston Energy, L.P. Frank, to this day continues to dedicate his time and effort to the various pursuits which add up to a career that can best be described as outstanding.

Frank Harrison has unselfishly given fully of his time and talent in so many ways. In addition to a successful career as a petroleum geologist, he has continually found time to participate in professional societies, civic organizations, his church; or an offer to help or advise a needy friend or colleague. In these pursuits he has gained the utmost respect for his ability both as a leader and a concerned citizen; concern for the geological profession, the petroleum industry and concern for his community and family. It is a privilege to recognize him as the 2009 LAGCOE Looey.



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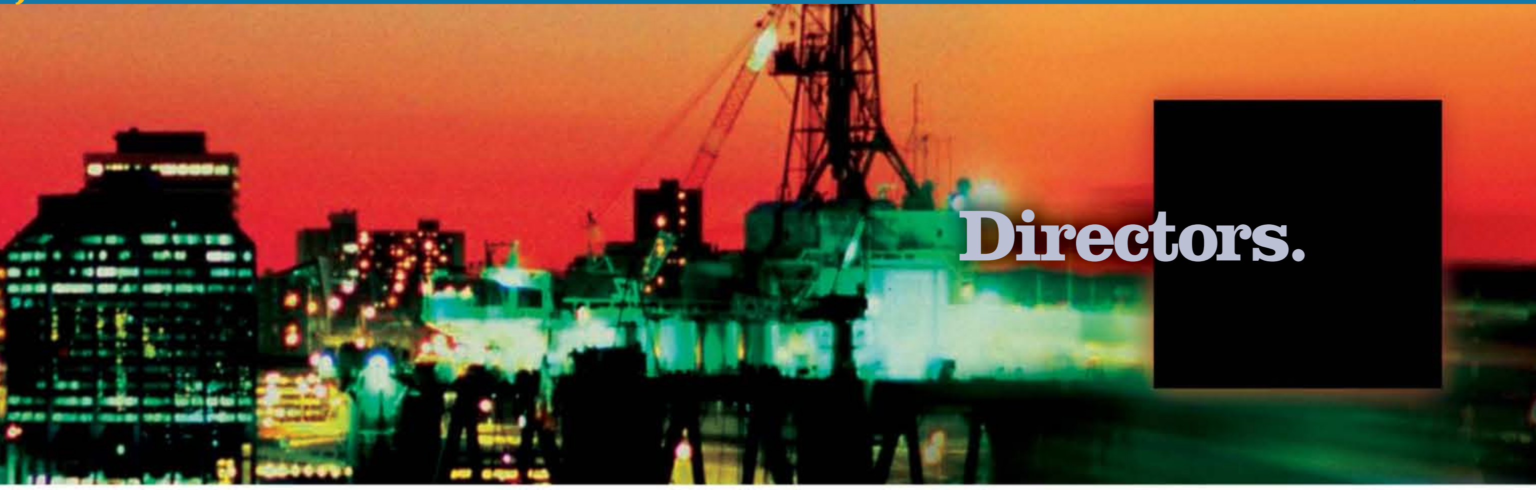

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# University of Louisiana Lafayette.

The partnership between the University of Louisiana and the Oil and Gas Industry is a strong one, and that's thanks in large part to a thriving Petroleum Engineering Department.

Since 1955, the Petroleum Engineering Department in the College of Engineering has been educating undergraduates and graduates for the workforce and advancing the industry through faculty research including well completion, production optimization and drilling mechanics. For over 50 years, it has educated graduates who serve the oil and gas industry worldwide.

"Petroleum Engineering graduates of UL Lafayette are some of the best in the industry," said Dr. Ali Ghalambor, head of UL Lafayette's petroleum engineering department. "They are highly sought after by major production companies, the service industry, as well as smaller independently-owned companies."

UL Lafayette is one of only 16 schools nationwide to offer a petroleum engineering curriculum.

## STUDENT ACHIEVEMENT

The UL Lafayette Student Chapter of the Society of Petroleum Engineering (SPE) is one of the best. Last year, it was recognized as the 2008 Outstanding Student Chapter during the 2008 SPE Annual Technical Conference and Exhibition.

There are nearly 125 student chapters worldwide. The award recognizes exceptional merit in a chapter whose programs, activities and level of participation in an academic year distinguish that chapter from other chapters. The award is only presented when a student chapter meets all criteria.

"They are extremely active in university and industry events. They participate in community service projects, fundraising activities, and they mentor first-time freshman and international students, helping them adjust to academic life," said Ghalambor, faculty advisor to the SPE Student Chapter. "Our students have gained global recognition among industry professionals for their strong show of participation and their enthusiasm for working in the petroleum industry."

## FACULTY AND FACILITIES

Petroleum Engineering at UL Lafayette also has established a distinguished tradition in training, continuing education, research and economic development. The department is internationally known for its many contributions in drilling, well completions and production technology, and its faculty has published more than 10 books in the last several years.

The industry has utilized the Petroleum Engineering Department's excellent laboratory facilities for various testing and product development over the years. The department, with the assistance from several petroleum professionals, is planning and organizing the 2010 Society of Petroleum Engineers International Symposium and Exhibition on Formation Damage Control in Lafayette, which is the premier event for well completion technology.

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# University of Louisiana Lafayette.

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## INDUSTRY TIES

Students and researchers now have access to the same exploration and production modeling software used by the oil and gas industry thanks to an historic $17.5 million software gift from Schlumberger, the world's leading oilfield service company.

The donation included 17 licenses of ECLIPSE* Parallel, a leading-edge software product created by Schlumberger to help simplify oil and gas reservoir simulation—a mathematically complex and computationally intensive enterprise.

The software included a license of Merak PEEP, a leading-edge software product also from Schlumberger to simplify oil and gas economic analysis. The UL Lafayette Petroleum Engineering advisory council recommended it for the new Petroleum Property Valuation and Risk Analysis course.

A license for Petrel, seismic interpretation and geologic modeling software, was also included. The Petrel software is an integrated workflow from seismic to simulation that provides seamless integration with the ECLIPSE reservoir simulation software and rapid production history matching workflows. Schlumberger donated the software to UL Lafayette as part of an effort to increase industry-standard geology and geophysics software knowledge for students. This preparation will broaden the skill sets of university geosciences and petroleum engineering graduates, making them more attractive in the job market.

**Dr. E. Joseph Savoie**
President of UL Lafayette

Another donation to Petroleum Engineering came from Landmark Graphics. The company donated nearly $10 million of software for evaluating petroleum prospects. The software optimizes drilling projects; perform geological, geophysical and seismic analyses.

Dr. Fathi Boukadi, who works and supervises students' projects and research through this software, stated that the availability of such technology has enabled the department to conduct many studies, evaluate many reservoirs in the Gulf of Mexico and allow undergraduate students to complete design projects using practical case studies.

The department has been the beneficiary of many substantial equipment contributions by such organizations as Society of Petroleum Engineers, American Petroleum Institute, American Association of Drilling Engineers, Chevron, Halliburton, Knight Oil Tools, LAGCOE, Lafayette Oil Man's Sporting Clays and International Association of Drilling Contactors. The funds enabled the department to modernize its drilling fluids laboratory and acquire simulators for well control training and instruction.

These contributions will continue the department's tradition of supplying the petroleum industry with excellent workforce and relevant technology.



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**Wachs Subsea** .......................................... **EH-25**

**Warrior Energy Services** .......................................... **BOS-246**

**Water Weights** .......................................... **BOS-249**
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tel (337) 839-2830
fax (337) 839-2832
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**Weatherford International** .......................................... **EH-186,187**

**Well Control School** .......................................... **EH-56**

**Wellbore Specialties** .......................................... **ROS-40**

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**Wellhead Distributors International** ....................................**A-109,110,131,132**
4606 FM 1960 West, Ste. 560
Houston, Texas 77069
United States
tel (281) 448-1000
fax (281) 448-1001
www.wellheaddistributors.com
sales@wellheaddistributors.com
Wellhead Distributors Int'l, WDI, is a manufacturer and distributor of API-6A products. WDI offers flanged casing and tubing suspension equipment; gate valves; chokes and mud valves; spare and replacement parts; consumable products; and more.

**Wellmark**.........................................................**A-195,196**
1903 S.E. 29TH Street
Oklahoma City, Oklahoma 73129
United States
tel (405) 672-6660
fax (405) 672-6661
wellmarkco.com
twc@wellmarkco.com
Established in 1982, Wellmark began with a single product line. Today Wellmark operates in a 60,000 sq ft state of the art manufacturing facility producing a broad range of oil and gas equipment.

**Wellstream International, Ltd**............................**EH-171**
11210 Equity Drive
Houston, Texas 77041
United States
tel (281) 249-0900
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FlexSteelPipe.com
john.worrell@wellstream.com
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**WesMor Cryogenic Companies**................................**L-24**
1802 W. D St.
P.O. Box 1477, 77572
LaPorte, Texas 77571
United States
tel (281) 470-2512
fax (281) 470-2527
www.wesmor.com
info@wesmor.com
WesMor Cryogenic Companies, "Where Quality Matters", specializes in manufacturing, rebuilding, and repairing all makes of cryogenic vessels. We offer a full line of trailer maintenance and repair service including vacuum investigation and complete rehabilitation projects.

**West Coast Logistics** ............................................ **EH-24**

**Western Tydens**.................................................... **EH-65**
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tel +44 1752 891360
fax +44 1752 891395
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info@westerntydens.co.uk
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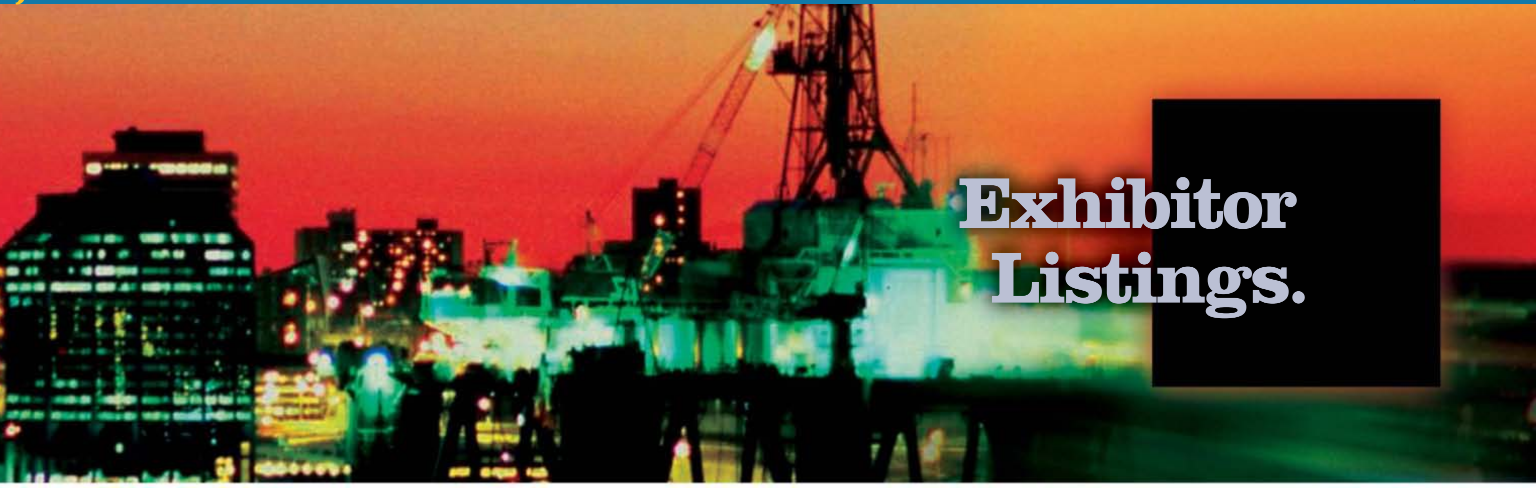

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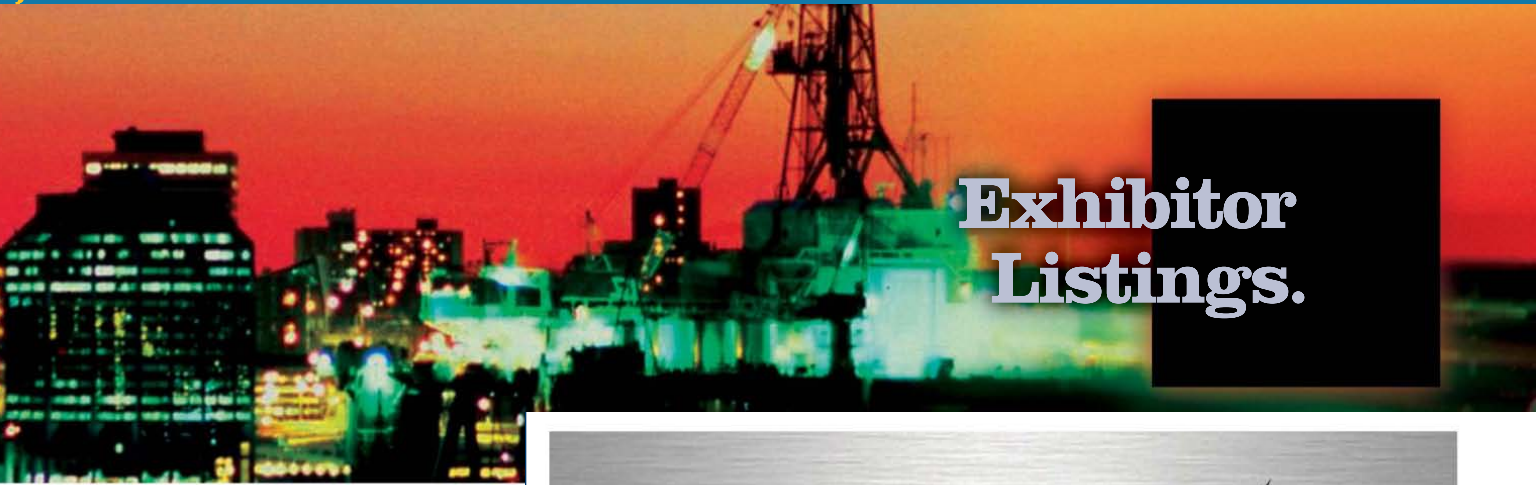

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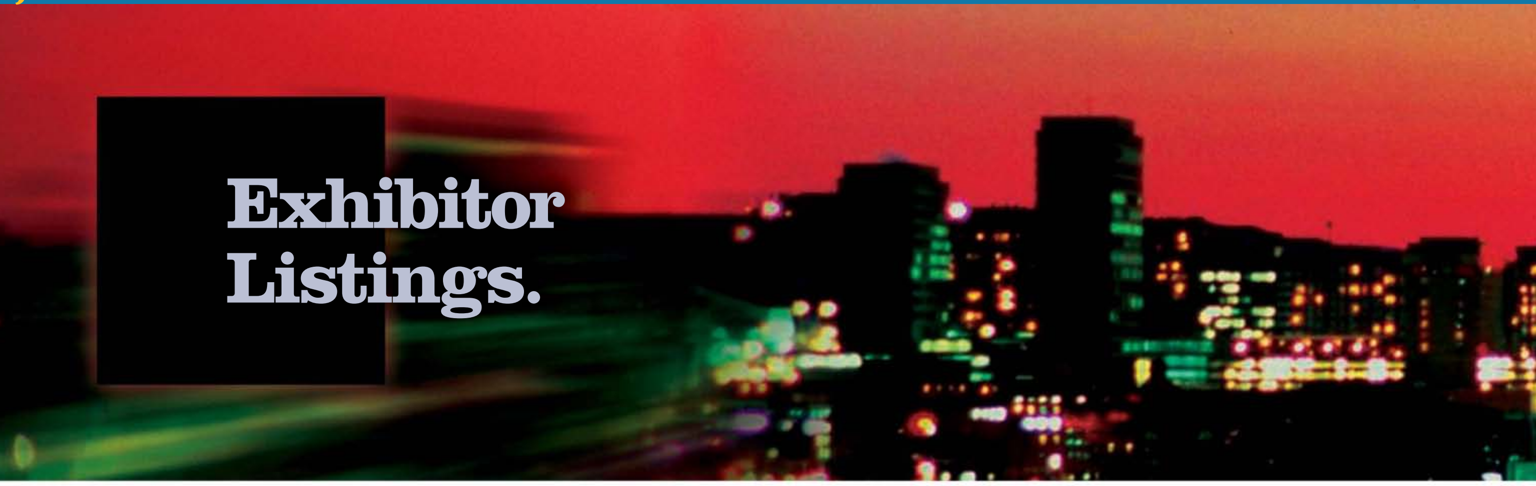

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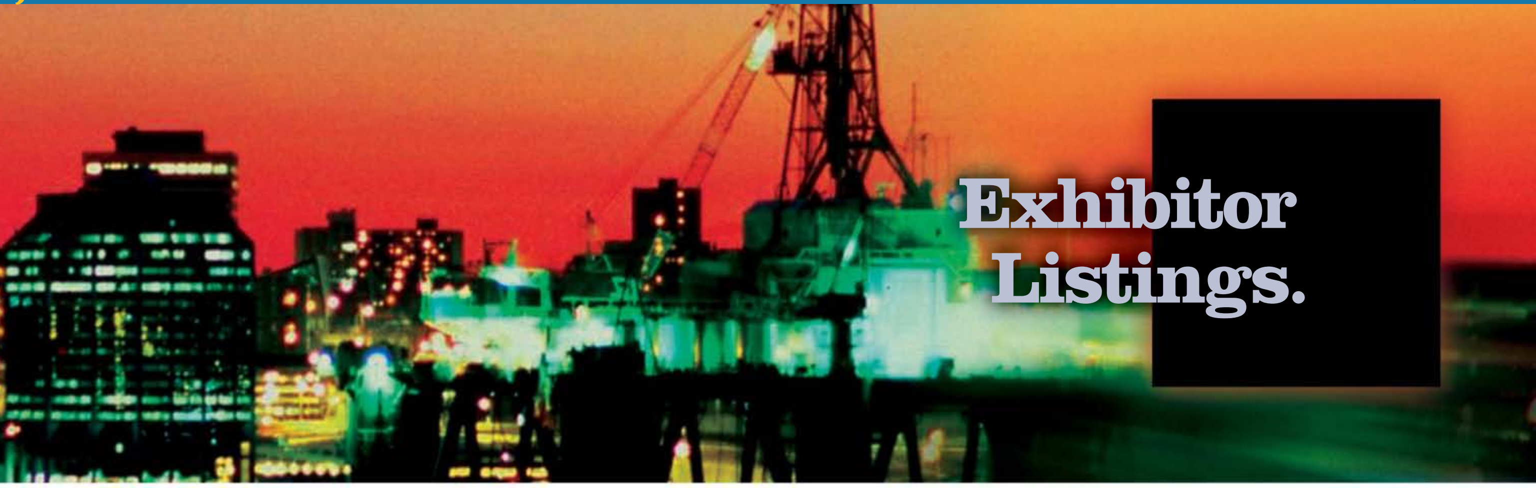

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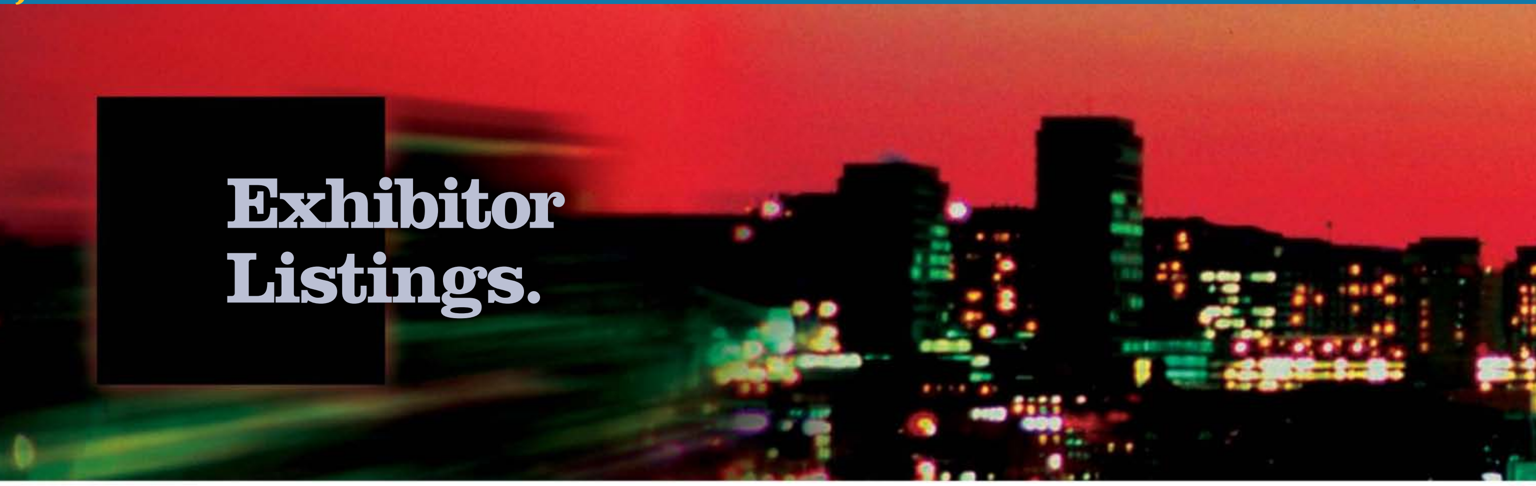

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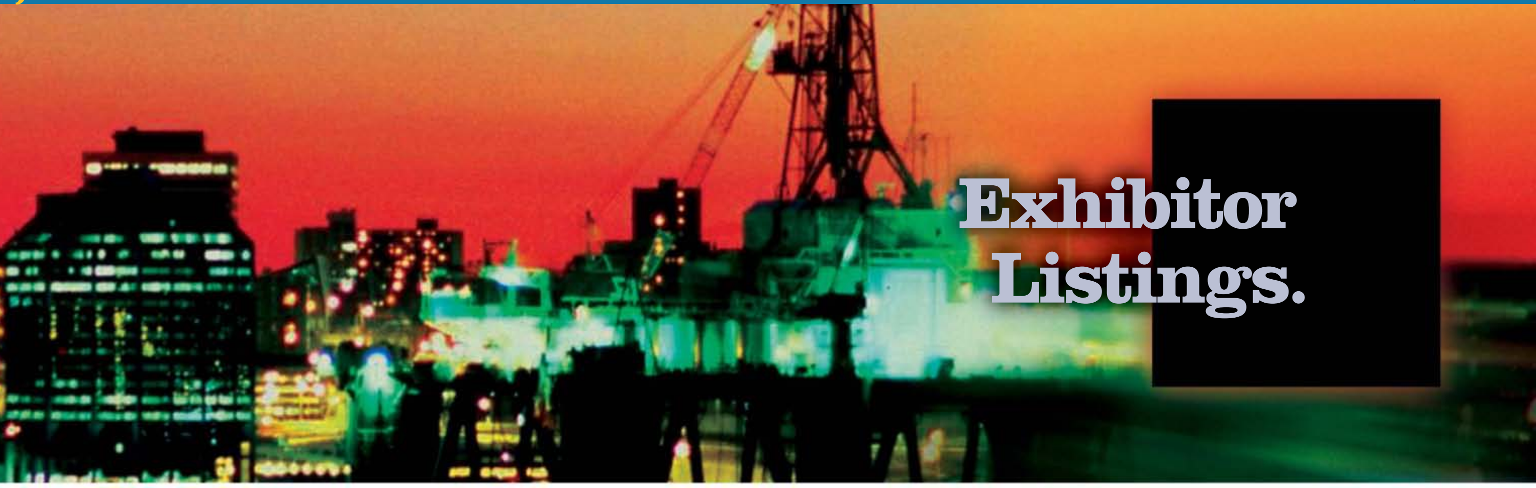

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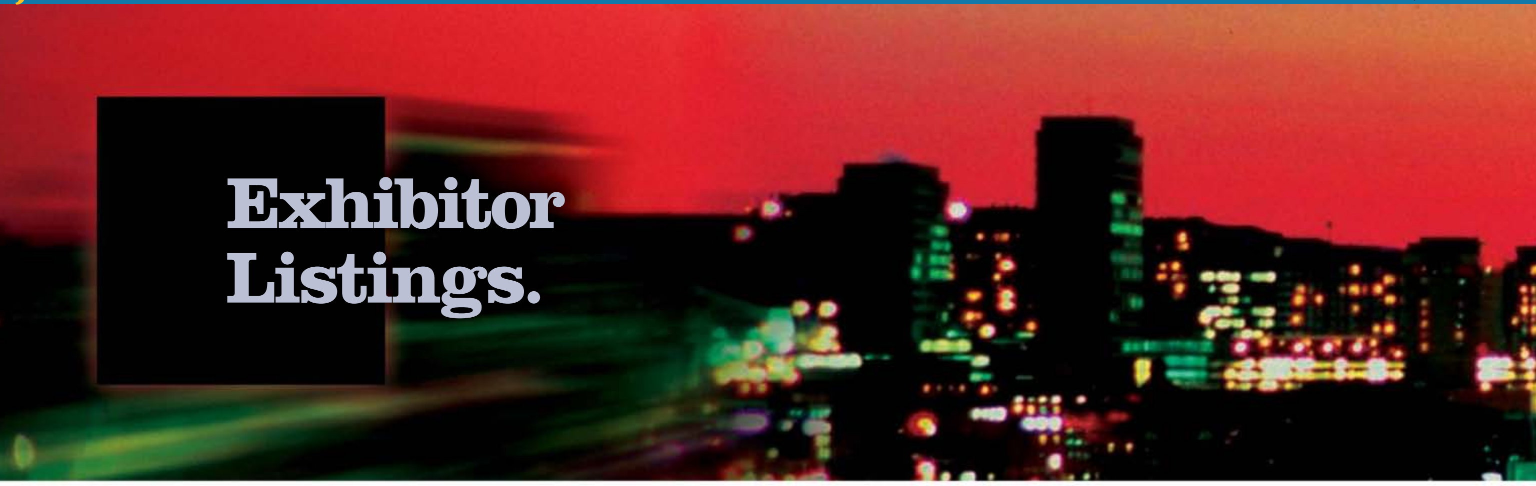

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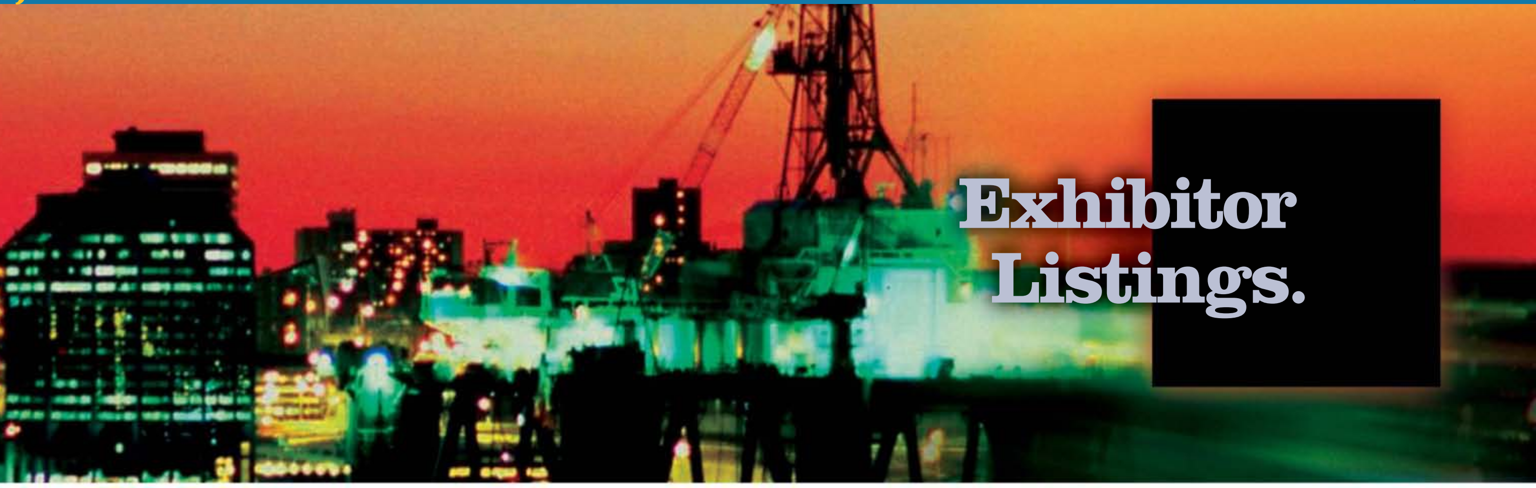


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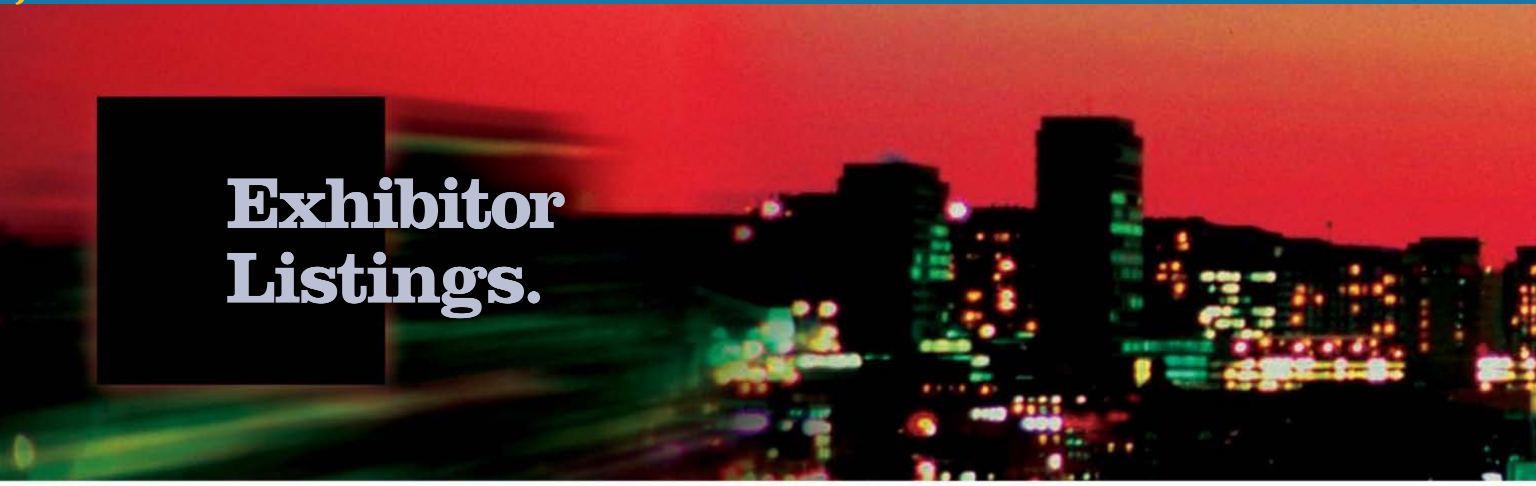

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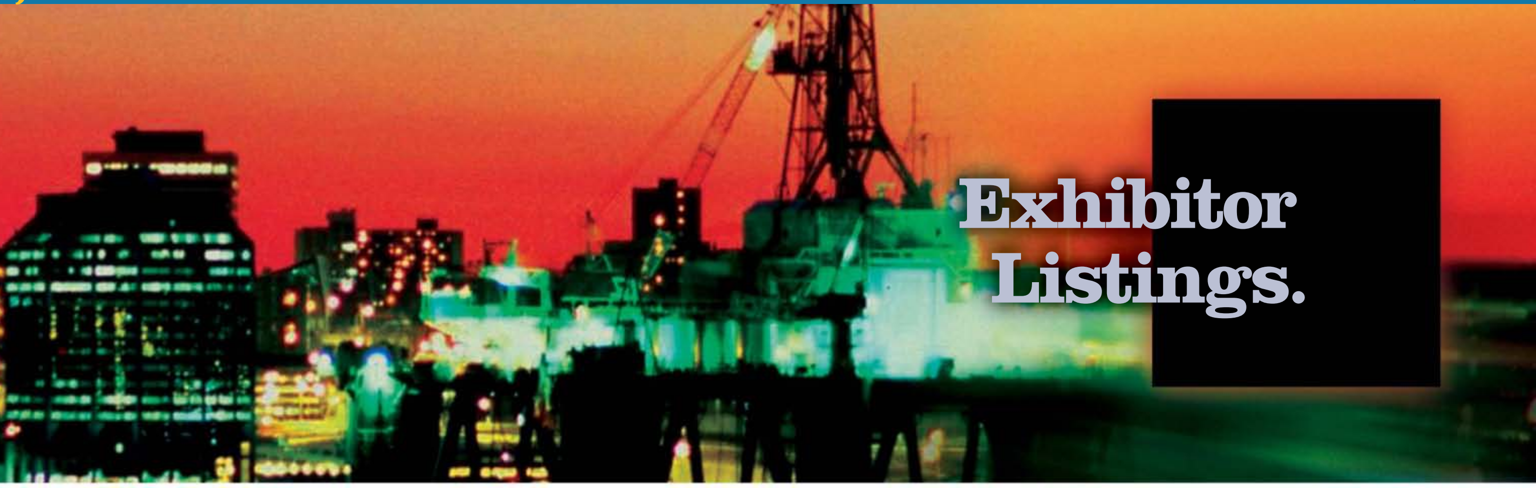

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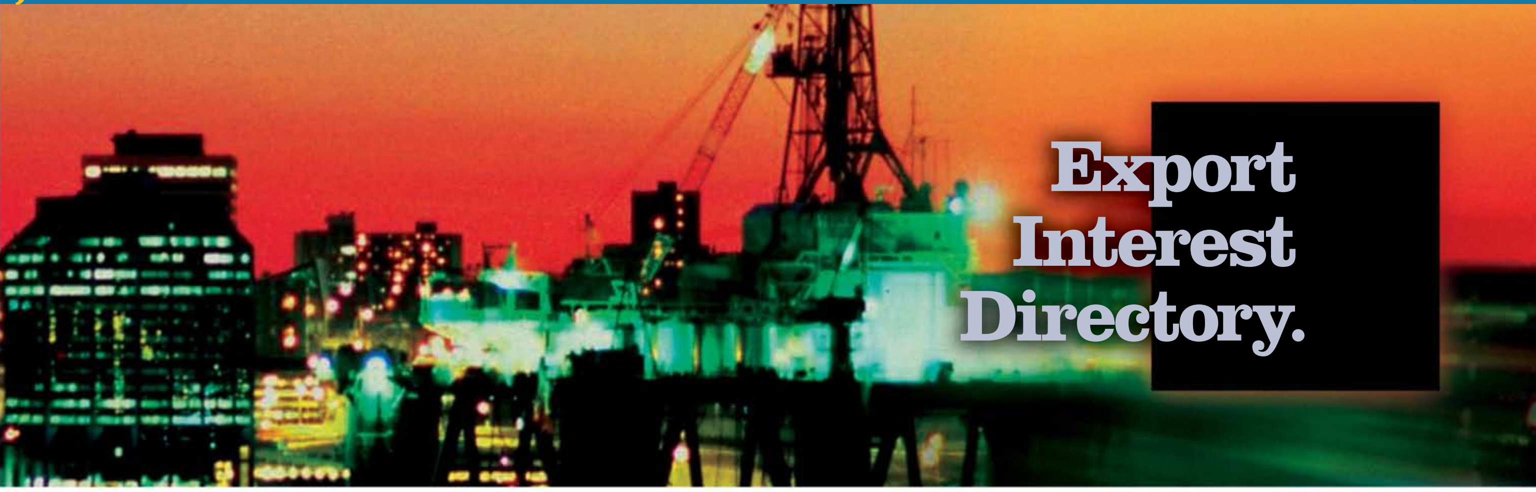
| Winters Instruments | EH-167 |
| X-Cel Superturn Ltd | A-88 |



# Export Interest Directory.

The following exhibitors have expressed interest in exporting and are participating in the **U.S. Dept. of Commerce International Buyer Program** at LAGCOE.

- AGGREKO, LLC. ..... **ROS-67,68,81,82**
- AGI Industries ..... **A-184,185,186**
- Acadian Monitoring Services ..... **A-183**
- Airtap Communications ..... **BOS-150**
- Alloy Custom Products ..... **BOS-259**
- American Warrior, Inc. ..... **ROS-28**
- Amgresco Solar ..... **A-106**
- Armstrong Oil Directories ..... **A-20**
- Atchafalaya Measurement, Inc. ..... **A-143,144**
- Atlantic Communications ..... **L-15**
- Atlas Copco Hurricane ..... **ROS-29,30**
- Automatic Power, Inc. ..... **EH-60,61**
- Aztec Tubular Products ..... **EH-28**
- Baker Hughes Incorporated ..... **EH-71**
- Bestolife Corp. ..... **A-11**
- BullEx Digital Safety ..... **EH-36**
- Burner Fire Control, Inc. ..... **ROS-60,61**
- C & C Technologies, Inc. ..... **A-192**
- Cameron Drilling & Production Systems ..... **EH-143,144,145,146, 163,164,165,166**
- Capital Valve & Fitting Company ..... **A-34,35**
- Cardon Sales Company, LLC ..... **A-140**
- Cargotec USA, Inc MacGREGOR-PCS ..... **ROS-8,9,17,18**
- Caseco Truck Body & Equipment Sales, LLC ..... **ROS-73,74,75,76**
- Certified Laboratories ..... **EH-168**
- Champion Technologies ..... **EH-30**
- CheckPoint ..... **A-191**
- Compression Leasing Services, Inc. ..... **ROS-51,52,53,54**
- CORTEC Fluid Control ..... **A-40,41**
- Cryogenic Industries - Houston ..... **BOS-213**
- CUDD Energy Services ..... **ROS-55,56**
- Custom Metal Craft Inc ..... **EH-132,133**
- DACSIS, LLC ..... **L-36,37**
- Datacom ..... **BOS-204**



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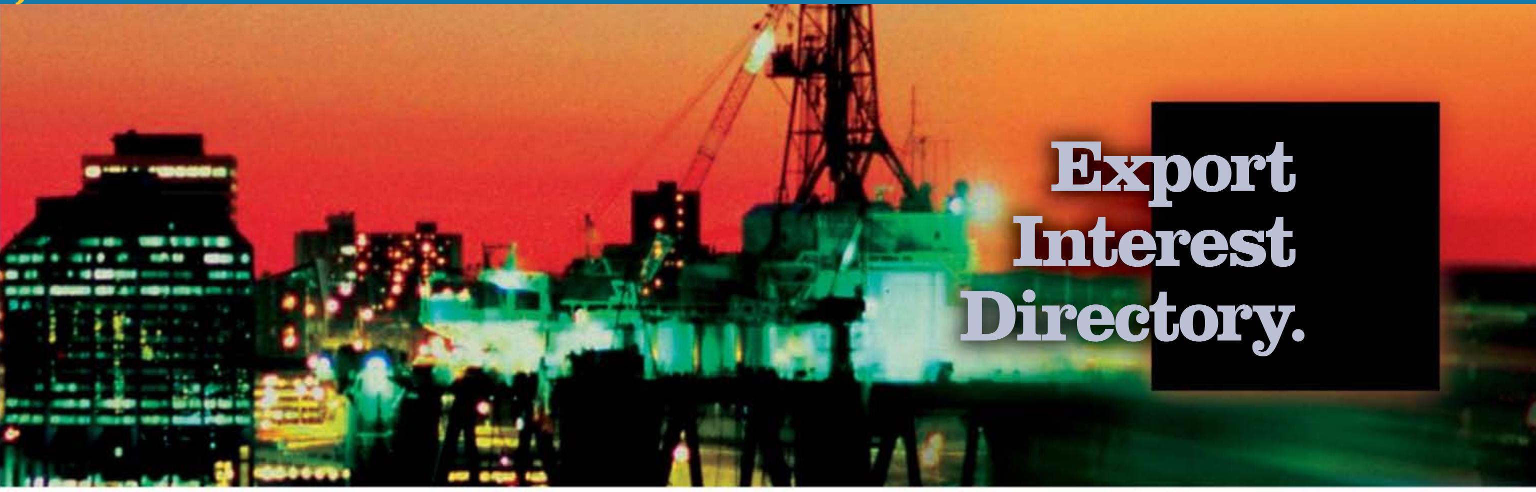
# Export Interest Directory.



# Export Interest Directory.

# Exhibitor Index.

# Product Index.

# Product Index.



## e-BUSINESS



## ENGINEERING & SERVICES

# Product Index.

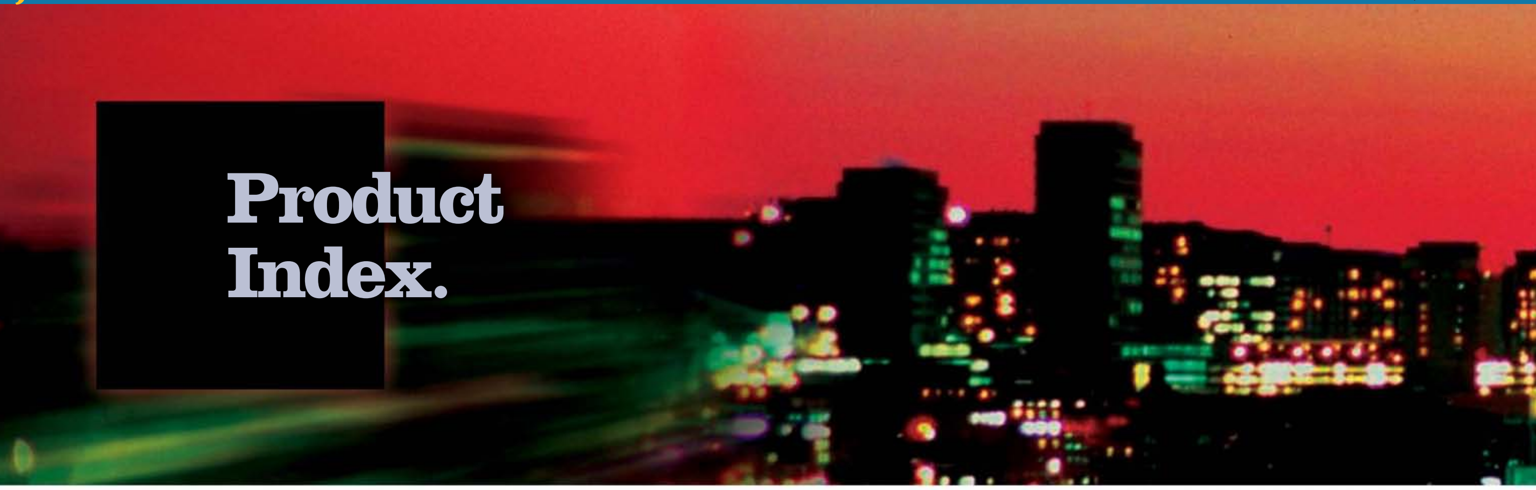


## ENHANCED RECOVERY



## ENVIRONMENTAL PROTECTION & REGULATORY SERVICES

# Product Index.



## EXPLORATION



## FINANCIAL & INVESTMENT



## INSTRUMENTS & CONTROL



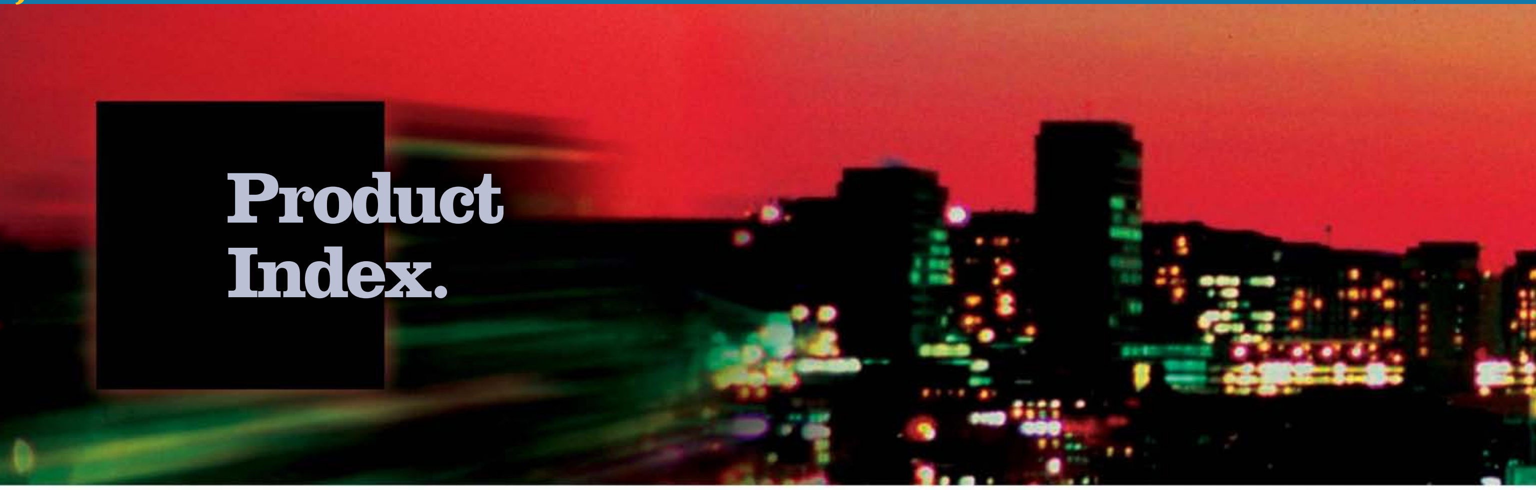
## LOGGING & FORMATION EVALUATION

# Product Index.

## MAINTENANCE & MATERIALS



## MARINE EQUIPMENT & SERVICES (not directly related to wells)



# Product Index.

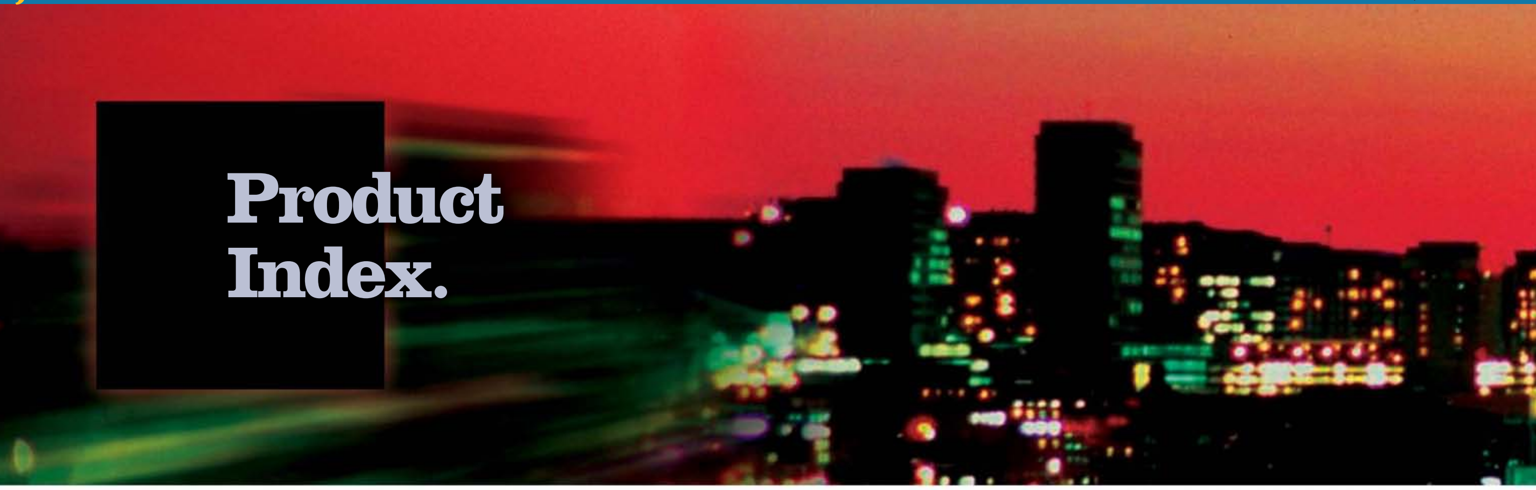
# Product Index.



## POWER SUPPLY



## PRIME MOVERS (PUMPS, COMPRESSORS, TURBINES, ENGINES, GENERATORS)



# Product Index.



## PROCESS EQUIPMENT & SERVICES

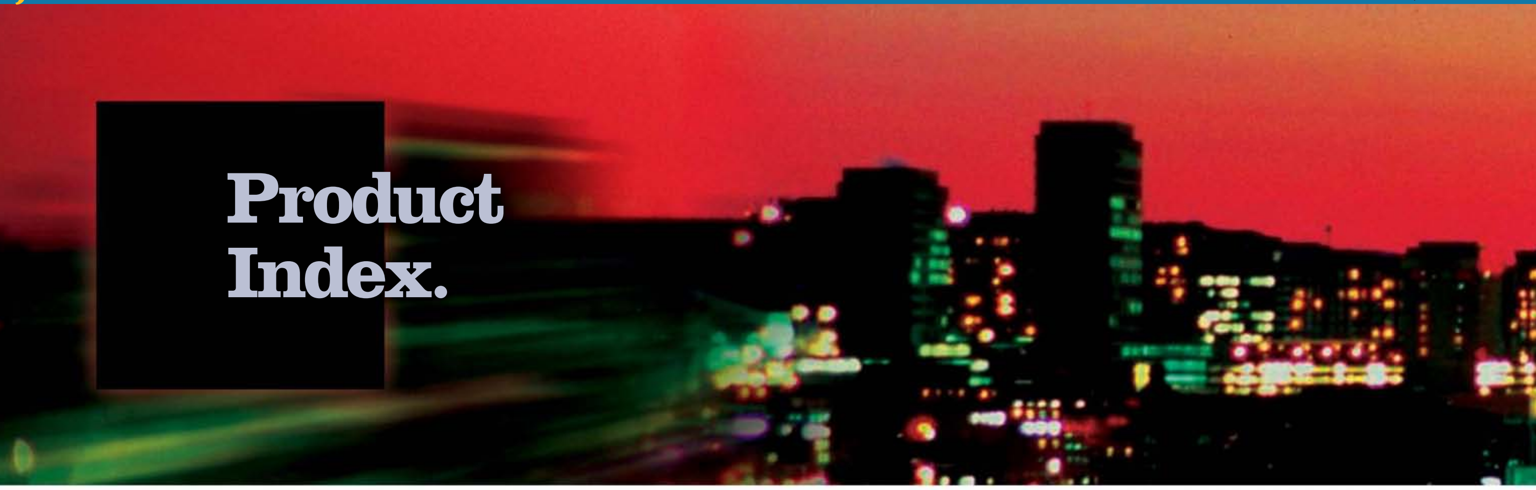


## PRODUCTION

# Product Index.



## PUBLICATIONS, TECHNICAL LITERATURE, TRAINING, AND EDUCATION



# Product Index.





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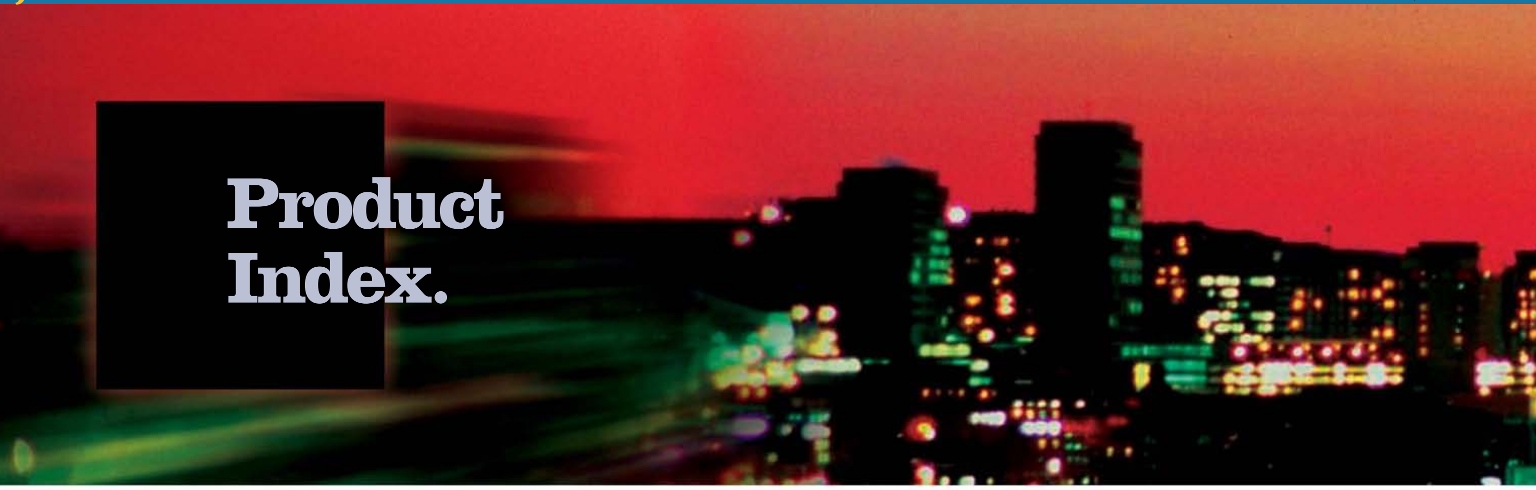
## TRANSPORTATION & COMMUNICATION



## TUBULARS & PIPING

# Product Index.





## ■ VALVES & ACTUATORS

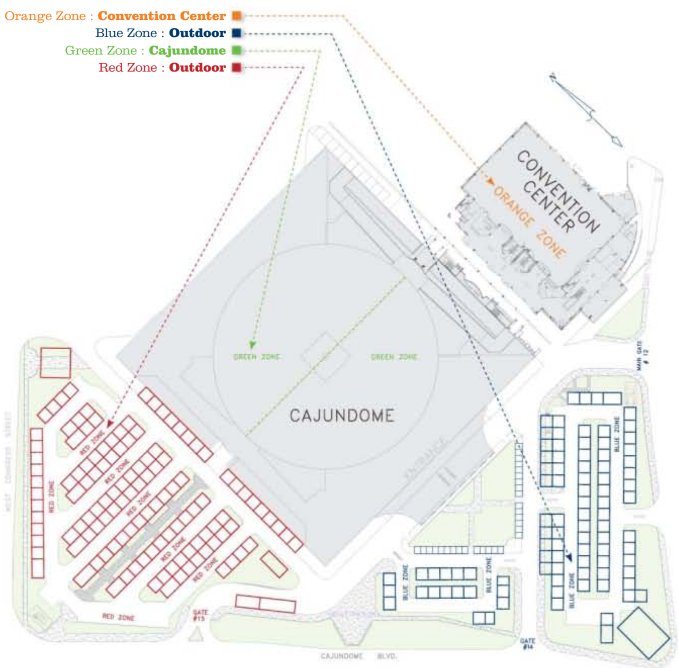


## ■ WELL COMPLETION

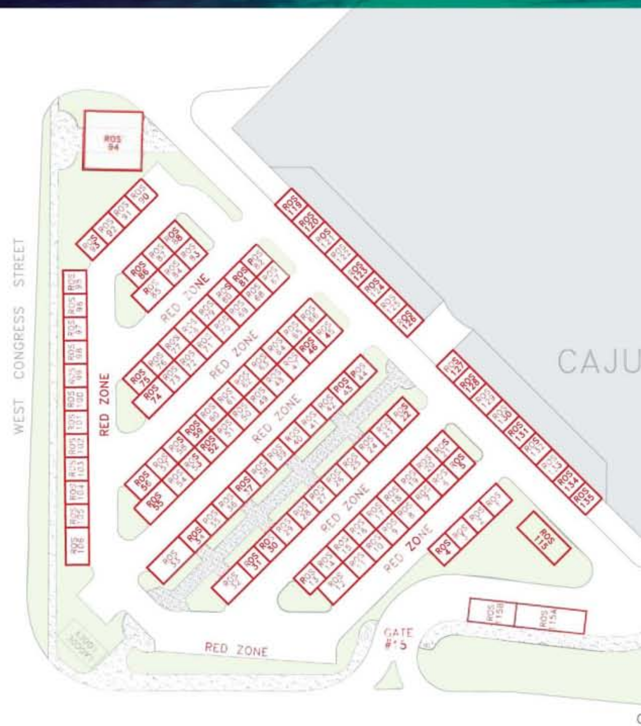


Outdoor Blue Zone.
NDOME
BLUE ZONE
BLUE ZONE
BLUE ZONE
BLUE ZONE
GATE 13
GATE #14
REGISTRATION
AJUNDOME BLVD.

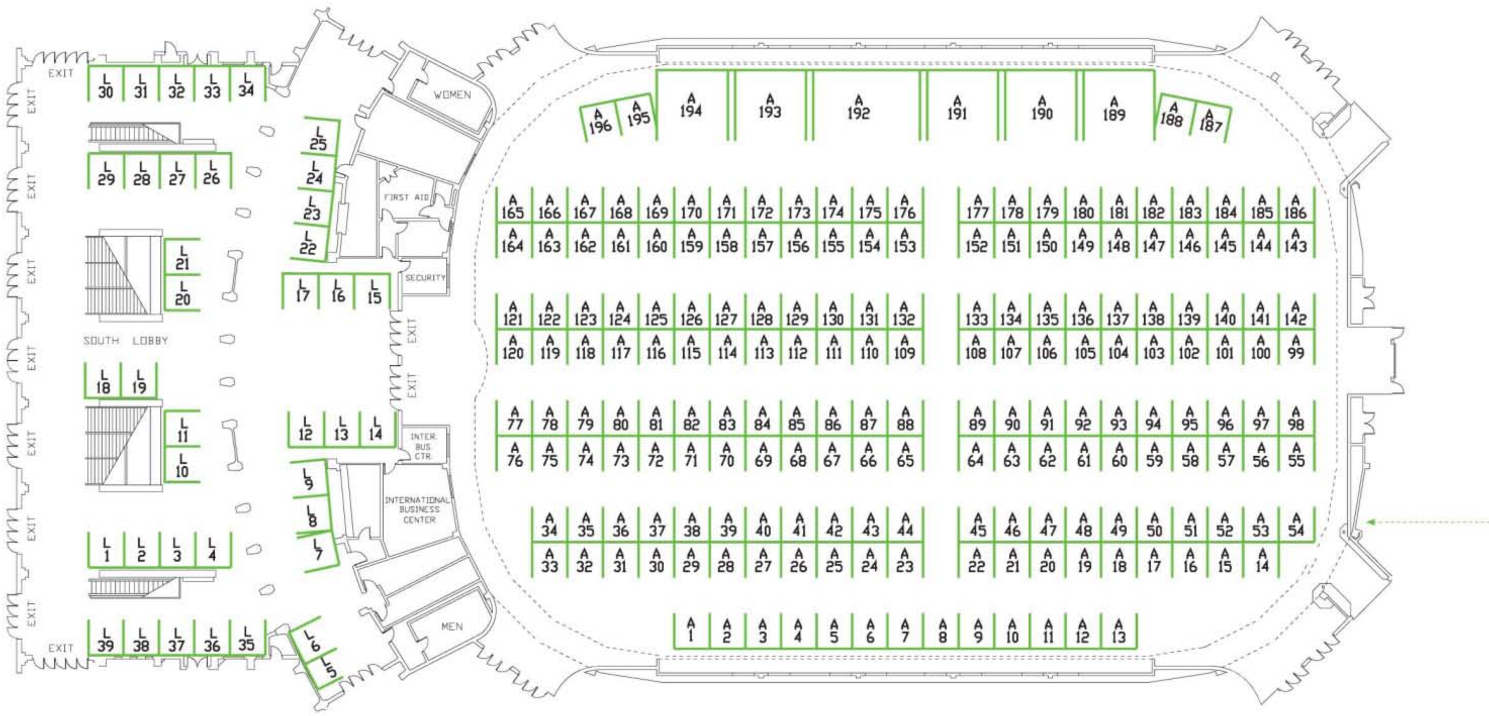
## 2009 LAGCOE Map.




## Outdoor Red Zone.



## Cajundome Arena Green Zone.



# Convention Center Orange Zone.