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Continuous Viscosity Profile Aids Production Facilities Design

Location: Campos Basin, Brazil

Client: Petrobras

Objectives:

- ✓ Characterize the reservoir to plan the field development
- ✓ Characterize the reservoir fluid to help design lifting and production facilities

Challenges:

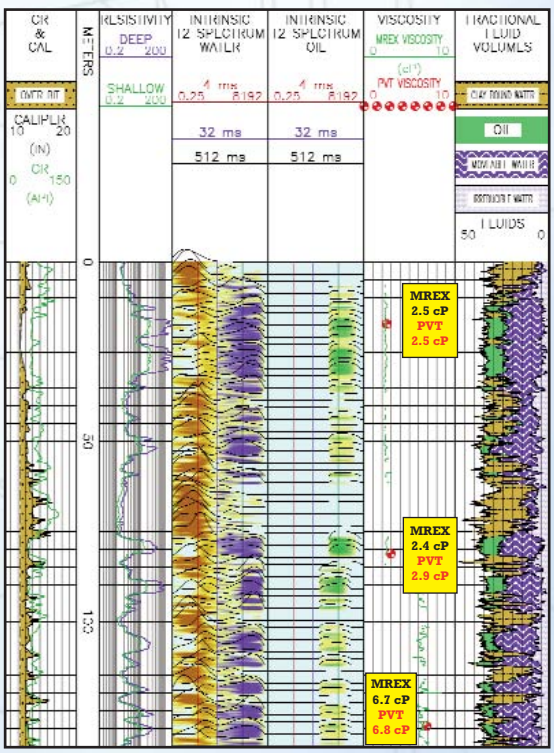
- ✓ Reservoir oil composition is expected to vary. 14 - 15° API oil is common, but 25° API also is found in offset wells.

Solution:

- ✓ The Baker Atlas MR Explorer℠ (MREX℠) service identified reservoir intervals with different oil properties.
- ✓ Baker Atlas' Reservoir Characterization Instrument® (RCI®) service collected six single-phase fluid samples in the identified intervals.

Results:

- ✓ Single-phase samples provided high-resolution PVT characterization of the reservoir fluid. Average contamination is less than 0.4%.
- ✓ The MREX analysis characterized in-situ oil viscosity as a continuous curve, matching measured viscosity within 5%.
- ✓ The PVT properties and in-situ viscosity profile helped client optimize production facilities.



Dual ESP Systems Increase Revenues $13.2 Million from Marginal Offshore Field

Location: Brazil

Problem:

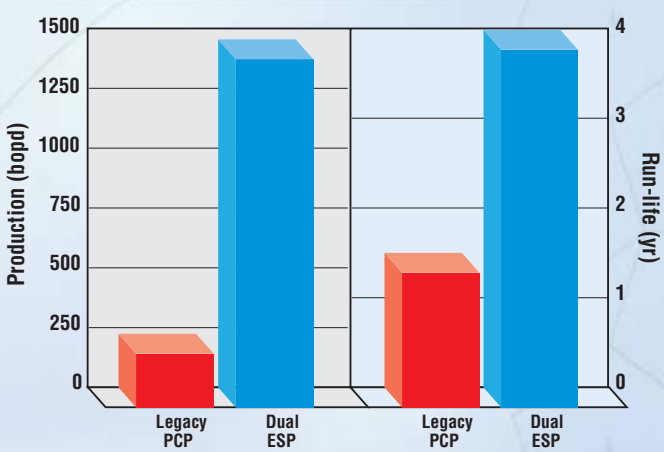
- ✓ Four wells experienced production declines, equipment failures with progressing cavity pump systems.
- ✓ Production fell from 754 bopd to 230 bopd.
- ✓ High operating cost

Solution:

- ✓ Centrilift replaced existing pumps with dual ESP systems
- ✓ Slim line profile designed for 7-in. casing

Results:

- ✓ Production increased 526% to 1440 bopd
- ✓ Runlife increased from 1.5 years to 4.0 years
- ✓ Added $13.2 million/year in revenue, based on $30/bbl oil
- ✓ Achieved payback in 10 months.



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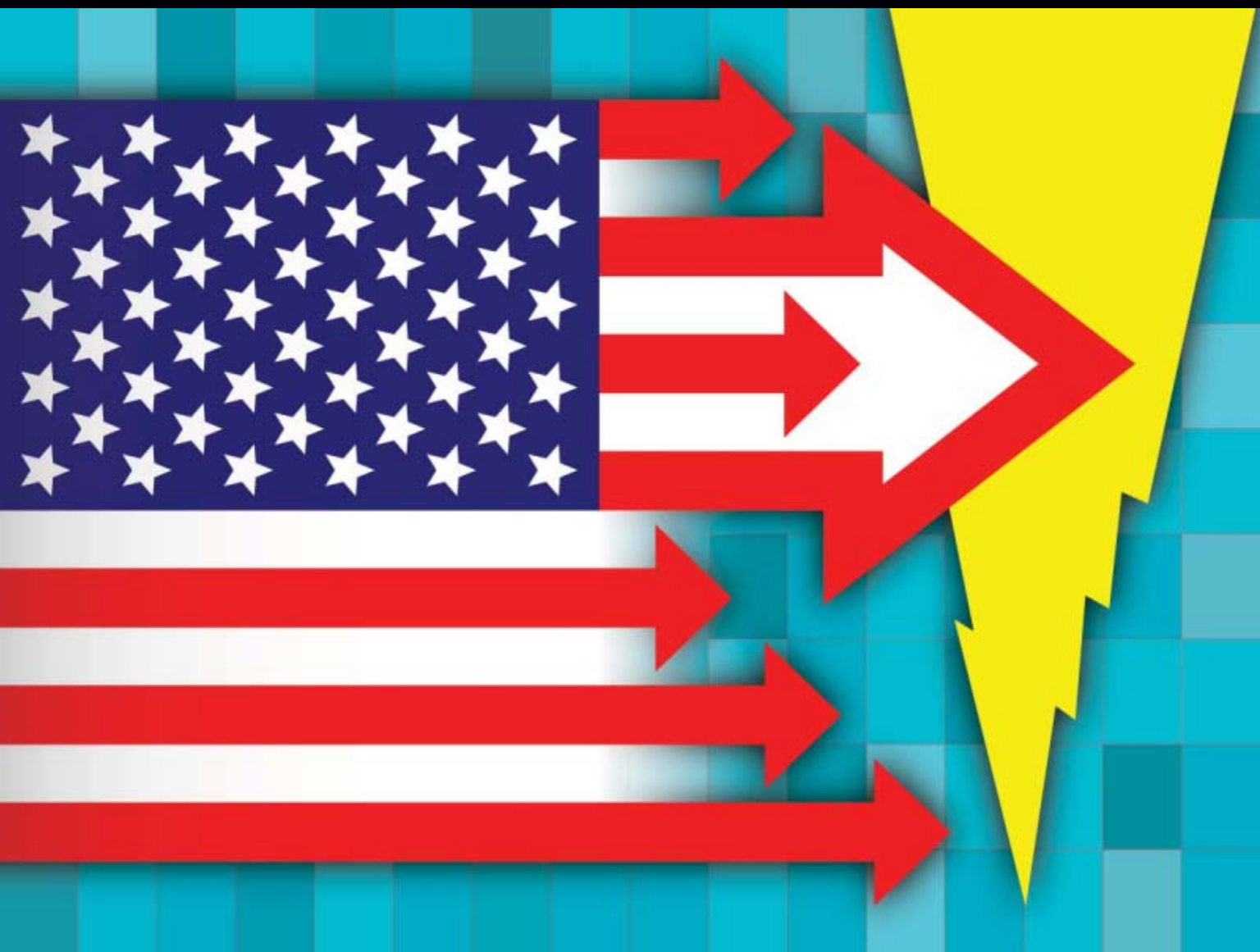

US Energy Politics

New concepts highlight Columbia River basin's potential
Peak oil models forecast China's oil supply, demand
Systems approach improves start-ups
Supersonic ejector captures, reinjects leaked vent gases

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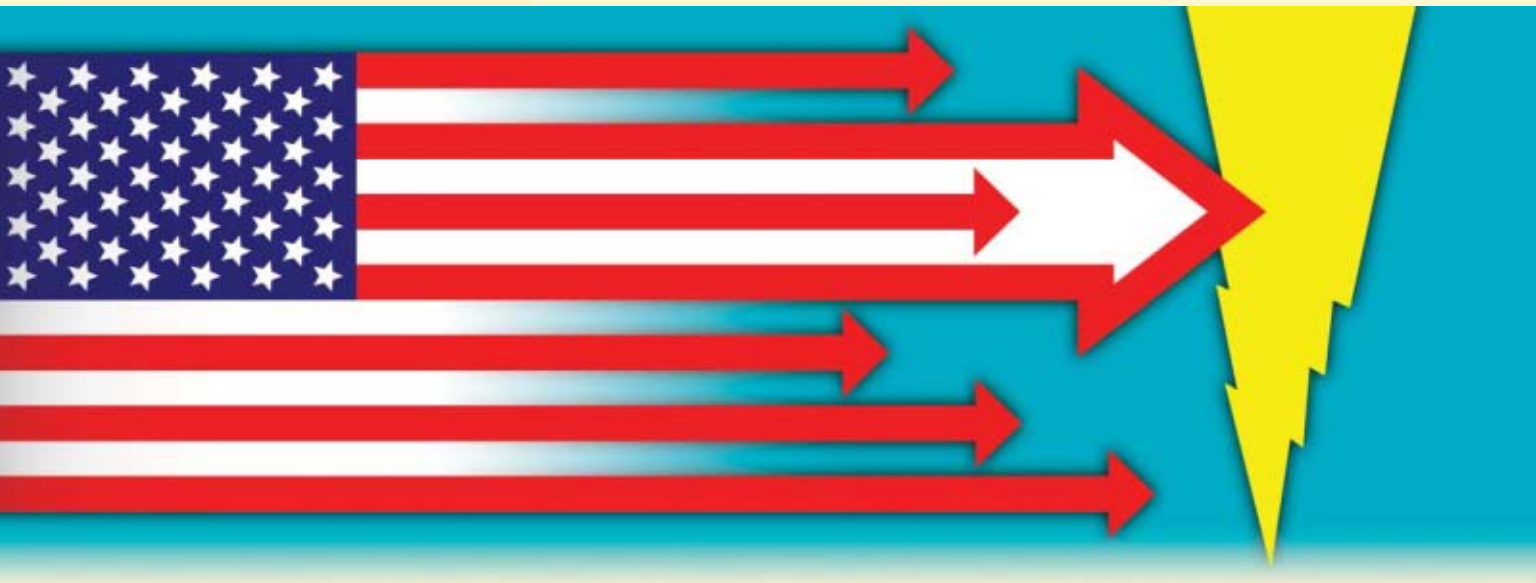
Jan. 14, 2008
Volume 106.2

US Energy Politics



Regular Features

Cover

US President George W. Bush called the 2007 Energy Independence and Security Act, which he signed into law on Dec. 19, 2007, an example of what can be accomplished when Congress and his administration worked together. In actuality the bill survived several confrontations in and out of Congress before it reached his desk. Washington oil and gas industry association executives are preparing for more bruising legislative battles this year as they fight to keep gains from the 2005 Energy Policy Act and 2006 Enhanced Energy Security Act. Their assessments of 2008's prospects, which range from guardedly hopeful to warily grim, are showcased in a special report on US Energy Politics, beginning on p. 20.
Cover design by Kermit Mulkins.

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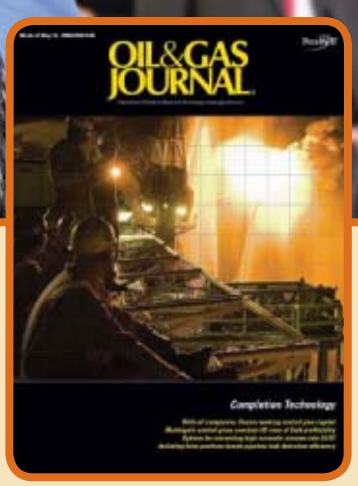

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[1] *Signet Readership Survey (February 2007)*

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General Interest — Quick Takes

Westwood sees jump in deepwater investment

Operators will make capital investments in deepwater exploration and production of nearly $25 billion/year by 2012, says John Westwood, managing director of the UK consultancy Douglas-Westwood Ltd.

Deep water, Westwood told the Society of Underwater Technology in Houston, represents "virtually the only place where giant oil fields will be found in future years."

Major international oil companies, he stressed, need that kind of discovery.

"There are literally hundreds of small, undeveloped offshore fields worldwide, but 'big oil' needs big fields," Westwood said. "The remaining 'easy oil' and indeed gas is in hard places and is being strongly competed for by countries such as China, India, and Russia. A recent example is Gazprom's move to gain access to Nigerian gas reserves."

The 2008-12 growth his firm projects for deepwater E&P expenditure represents growth over the prior 5 years of 30%. It will "drive demand for deepwater drilling rigs, floating production systems, subsea production hardware, and more," Westwood said.

Major companies increasingly turn to deepwater operations as production declines in continental shelf areas such as the North Sea and Gulf of Mexico and as access shrinks to opportunities elsewhere.

Westwood noted that national oil companies control 80% of global oil reserves, the same share international oil companies controlled in the 1970s.

At the same time, international companies face rapidly rising costs.

For example, Westwood said, lifting costs in the UK North Sea increased from $15/bbl in 2005 to $25/bbl.

Westwood cited the Arctic as another potentially rich but difficult producing area, where Russia, Canada, and the US are competing in "a great subsea land claim."

Iraq starts lease round prequalification process

Iraq's Oil Ministry has invited international oil companies to submit applications for a prequalification process ahead of the country's planned oil licensing round.

The ministry said the process would help to identify those companies that are qualified to work in the country, with only qualified and selected groups to be invited to participate in competitive bidding later.

The deadline for submissions is Jan. 31. Names of qualified companies will be published after this date.

The timing of the licensing round itself remains unclear, however, with the ministry only indicating that tenders for oil extraction and service contracts in southern, central, and northern Iraq would be issued "soon."

Meanwhile, Iraqi Prime Minister Nuri al-Maliki and Nechirvan Barzani, the prime minister of the Kurdistan region, held a round of talks on Jan. 2 to discuss pending issues between the central government and the government of the Kurdistan region.

High on the agenda of their talks were the oil contracts that the Kurdistan region government has signed.

An Iraqi spokesman said President Jalal Talabani and al-Maliki signed an agreement specifying that all signed contracts should be subject to the provisions of the Iraqi Constitution and that the government of the Kurdistan region should delay signing anything related to oil contracts.

Concerning the signing of oil contracts, Mahmud Uthman, a member of the Kurdistan Alliance, told London's Asharq al-Awsat newspaper that, "If the two sides do not agree on this issue, they will refer it to the Supreme (Federal) Court to look into it and decide whether these contracts are legal or illegal."

Total to share CCS pilot results with Indonesia

Total SA signed an agreement to pass on to Indonesia the results of its carbon dioxide capture and storage (CCS) pilot project near Pau in southwestern France.

The agreement gives the Indonesian Agency for the Research and Development of Energy and Mining Resources access to the main results of Total's pilot project in the Lacq basin.

This project involves extracting CO_2 from gases emitted by a boiler at a Lacq factory and reinjecting it 4,500 m underground in an old gas field.

Total plans the first injection of CO_2 in late 2008 and will inject a further 150,000 tonnes of CO_2 over the following 2 years and measure the results.

The project, one of the first in the world to include the whole chain from combustion to CO_2 geological storage, is primarily intended to prove the technical feasibility of an integrated carbon capture and storage scheme.

"It should enable Total to contribute to the fight against global warming and provide an efficient solution to help limiting the footprint of Total's activities in exploration and production, refining, and chemicals," Total said.

Total said Indonesia will be able to develop its technical and economical understanding of such a CO_2 storage scheme, especially concerning the geological aspects. That could assist the Indonesian government to establish an appropriate regulatory framework for similar projects in that country. ✦

Industry Scoreboard

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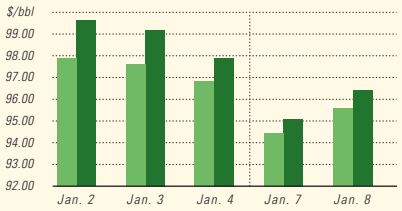
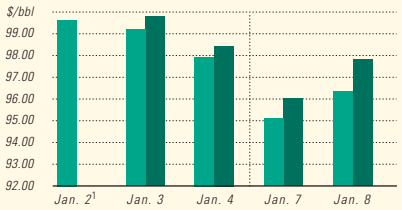
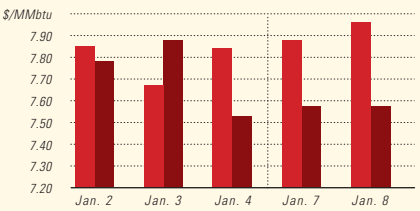


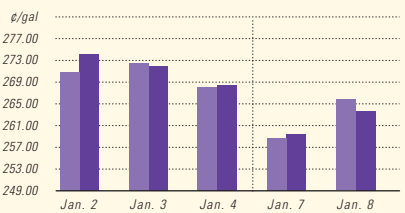
WTI CUSHING / BRENT SPOT



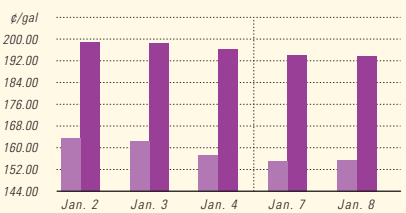
NYMEX NATURAL GAS / SPOT GAS - HENRY HUB



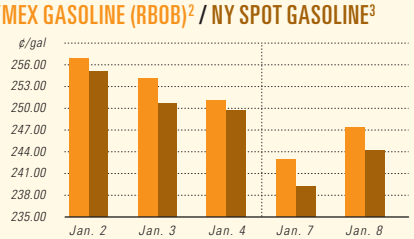
IPE GAS OIL / NYMEX HEATING OIL



PROPANE - MT. BELVIEU / BUTANE - MT. BELVIEU



NYMEX GASOLINE (RBOB)[2] / NY SPOT GASOLINE[3]



[1]Data not available, [2]Reformulated gasoline blendstock for oxygen blending, [3]Nonoxygenated regular unleaded.

US INDUSTRY SCOREBOARD — 1/14

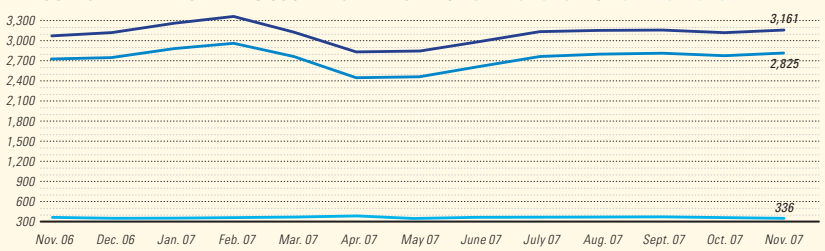
Latest week 12/28	4 wk. average	4 wk. avg. year ago[1]	Change, %	YTD average[1]	YTD avg. year ago[1]	Change, %
Demand, 1,000 b/d						
Motor gasoline	9,342	9,335	0.1	9,305	9,252	0.6
Distillate	4,506	4,265	5.7	4,252	4,168	2.0
Jet fuel	1,612	1,630	–1.1	1,622	1,633	–0.7
Residual	712	725	–1.8	740	688	7.6
Other products	5,056	4,836	4.5	4,824	4,878	–1.1
TOTAL DEMAND	21,228	20,791	2.1	20,743	20,686	0.3
Supply, 1,000 b/d						
Crude production	5,106	5,164	–1.1	5,118	5,101	0.3
NGL production[2]	2,390	2,416	–1.1	2,387	2,238	6.7
Crude imports	9,747	9,567	1.9	10,003	10,116	–1.1
Product imports	3,335	3,163	5.4	3,502	3,594	–2.6
Other supply[3]	959	828	15.8	964	1,025	–6.0
TOTAL SUPPLY	21,537	21,138	1.9	21,974	22,074	–0.5
Refining, 1,000 b/d						
Crude runs to stills	14,939	15,880	–5.9	15,239	15,240	—
Input to crude stills	15,139	15,729	–3.8	15,468	15,598	–0.8
% utilization	86.8	90.4	—	88.7	89.7	—

Latest week 12/28	Latest week	Previous week[1]	Change	Same week year ago[1]	Change	Change, %
Stocks, 1,000 bbl						
Crude oil	289,577	293,633	–4,056	320,975	–31,398	–9.8
Motor gasoline	207,842	205,857	1,985	203,853	3,989	2.0
Distillate	127,177	126,608	569	133,592	–6,415	–4.8
Jet fuel-kerosine	39,026	39,245	–219	37,560	1,466	3.9
Residual	39,595	40,991	–1,396	42,911	–3,316	–7.7
Stock cover (days)[4]			Change, %		Change, %	
Crude	19.0	19.2	–1.0	20.7	–8.2	
Motor gasoline	22.2	22.0	0.9	21.7	2.3	
Distillate	28.2	28.2	—	31.0	–9.0	
Propane	35.1	37.3	–5.9	43.5	–19.3	

Futures prices[5] 1/4			Change		Change	%
Light sweet crude, $/bbl	98.17	95.68	2.49	60.76	37.41	61.6
Natural gas, $/MMbtu	7.71	7.16	0.55	6.13	1.59	25.9

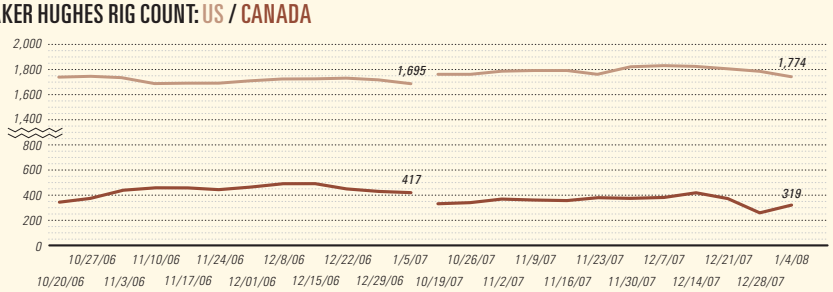
[1]Based on revised figures. [2]Includes adjustments for fuel ethanol and motor gasoline blending components. [3]Includes other hydrocarbons and alcohol, refinery processing gain, and unaccounted for crude oil. [4]Stocks divided by average daily product supplied for the prior 4 weeks. [5]Weekly average 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

Exploration & Development — *Quick Takes*

Partners make oil find with Julia in gulf

ExxonMobil Corp. and StatoilHydro AS have made an oil discovery 265 miles southwest of New Orleans in the Gulf of Mexico. Drilled to a total depth of 9,500 m, the Julia discovery well lies in 2,000 m of water.

Partner StatoilHydro said further appraisal drilling is planned this year to determine the extent of the discovery. "This is a promising oil discovery," said Helen Butcher, StatoilHydro's exploration manager for deepwater Gulf of Mexico. "StatoilHydro is a major lease holder in Walker Ridge. This discovery supports our firm belief in this area," she added.

Julia is the first well drilled under a 2005 exploration agreement between StatoilHydro and ExxonMobil in deepwater gulf. StatoilHydro is participating in further developing two additional finds in the same area: Jack and St. Malo. Both are scheduled to come on stream after 2013.

Apache has drilling success with Argentine well

Houston independent Apache Corp. reported that its Seccion Banos-2004 well on the Argentine side of Tierra del Fuego island is producing 1,635 b/d of oil and 1.3 MMcfd of gas from the Lower Cretaceous Springhill sandstone. The well is the first large producer drilled following Apache's 700 sq-mile (1,800 sq-km), 3D seismic survey in the area.

"Prior to Apache becoming operator of this 714,000-acre block...very little 3D seismic had been acquired," said Apache Pres. and Chief Executive Steven Farris. "With 40% of the survey shot, and newly processed data arriving every day, we have identified more than 30 exploratory, field extension, and development locations."

Apache said SB-2004 had the highest initial production rate of any well drilled in 40 years of oil and gas activity on the concession. Drilled to 5,544 ft, it confirms the productivity of a sparsely drilled 20 sq mile area between three 40-year-old fields—Canadon Piedras, Cabo Nombre, and Bajo Grande. Apache has begun drilling the first of six potential offsets it has identified.

Production from SB-2004 follows Apache's development of the previously unexploited offshore discovery at Cabo Nombre Sur, 4.2 miles to the south. Two wells—CNS-2005 and CNS-2006—are producing a total of 11.5 MMcfd of gas and 53 b/d of oil.

Apache operates the Tierra del Fuego concession and holds a 70% working interest; Repsol-YPF SA holds 30%.

On Tierra del Fuego, Apache holds almost 2 million gross acres—714,000 acres on the Argentine side of the island and two recently awarded exploration blocks comprising 1.2 million acres on the Chilean side. Apache's net production on the island is 5,226 b/d of liquids and 122 MMcf of gas.

Natuna D-Alpha gas field development pact nears

Indonesia and ExxonMobil Corp. are nearing an agreement to renew their contract for development of Natuna D-Alpha gas field in the Natuna Sea, about 140 miles east-northeast of Natuna Island.

The two sides are now finalizing the wording of the agreement under which the government is set to secure a production split, according to Energy and Mineral Resources Minister Purnomo Yusgiantoro.

Under the former contract, ExxonMobil had a 100% production split (OGJ, Nov. 21, 1994, p. 30). However Purnomo said the government will seek a greater share for state-owned PT Pertamina. He did not say how much the government is seeking.

According to Indonesian state media, the Natuna Block is believed to have reserves amounting to 46 tcf of recoverable gas.

ONGC Videsh, Hindujas Group sign E&P pact

Seeking to acquire more oil and gas assets abroad, the board of ONGC Videsh Ltd. (OVL) has agreed to sign a memorandum of understanding with Hinduja Group, London, to jointly explore acquisition of overseas acreages, particularly in Iran. OVL is the overseas arm of India's state-run Oil & Natural Gas Corp.

"Now we will talk to the Iranian authorities on the projects," a senior OVL executive said. "Based on the opportunities, we will form a project-specific joint venture or an SPV."

For developing assets in Iran, OVL and the Hindujas will adopt a collaborative approach. Indications are that they were exploring joint opportunities in Iran's onshore Azadegan oil field and its offshore South Pars Phase 12 gas asset.

The equity structure and investment decision will be finalized once an equity stake in the two blocks is obtained. OVL and the Hindujas were understood to be in talks with a subsidiary of National Iranian Oil Co. for a presence in the two fields.

Azadegan, with reserves estimated at 33 billion bbl, is one of the largest oil fields to be discovered in the world during the past 30 years.

South Pars gas field contains about 50% of Iran's gas resources. Together with its extension, Qatar's North field, it is regarded as the largest offshore gas field in the world.

Iran awards Dayyer gulf block to Edison

Iran signed a contract with Edison of Italy for exploration rights to the 2.1 million acre Dayyer offshore block.

The block lies generally between Iran's coastal towns of Kangan and Bushehr, north across the Persian Gulf from the Qatar peninsula.

Edison plans to shoot seismic and drill one exploration well in a 4-year exploration period, investing €30 million.

National Iranian Oil Co. offered the block for bids in 2004. ✦

Drilling & Production — *Quick Takes*

Chesapeake growing Barnett shale production

Chesapeake Energy Corp. expects to complete, on average, a Barnett shale well about every 15 hr through at least 2010. The Oklahoma City company currently is using 38-40 operated rigs.

Aubrey McClendon, Cheasapeake's chief executive officer, said the company plans to continue acquiring leaseholds in Tarrant,

Johnson, and western Dallas counties in Texas. Additional acreage is being acquired by Chesapeake's own landmen and lease brokers as well as through land services agreements with leasing teams of four smaller companies.

The 2007 gross production exit rate from the Barnett share was 600 MMcfd of gas equivalent (400 MMcfd net) compared with a 2006 gross production exit rate of 250 MMcfd.

"We now will focus on achieving our 2008 gross production exit rate target of 900-1,000 MMcfd," McClendon said.

Petrobras lets contracts for Cascade, Chinook

Petrobras America has let a $50 million contract to Subsea 7 Inc. to design and install power cables, control umbilicals, and 16 jumpers for the deepwater Cascade and Chinook oil fields in the Gulf of Mexico. The fields are expected to start production in 2010.

Subsea 7 will handle 70 km of power cables, and it will use of its deepwater umbilical installation vessels in late 2009 and early 2010. "The final selection of vessel will be dependant on the size and weight of product to be installed following optimization by Petrobras and Subsea 7," the company said.

A floating production, storage, and offloading vessel will be used for the first time in the gulf to bring Cascade and Chinook onstream. At least two subsea wells in Cascade and one subsea well in Chinook will each be drilled to 27,000 ft and tied back to the FPSO. Based on reservoir performance, the development plan could be expanded to include additional wells on each unit.

Both fields are in Block 425 of the Walter Ridge area in 2,300-3,000 m of water. Petrobras is operator with 50% of Cascade and 66.67% of Chinook. Devon Energy Corp. owns the remaining 50% of Cascade, and Total E&P USA Inc. owns 33.33% of Chinook.

Total lets N. Sea platforms construction contract

Total E&P Nederland has appointed Fabricom Oil & Gas to design and construct its 21 offshore production platforms in the Dutch sector of the North Sea. The value of the deal was not disclosed.

Under the 5-year framework agreement, work will be carried out on a lump-sum basis under the construction-driven engineering principle in which the construction experience acts as a guideline for the engineering, Fabricom said. This new style of working is expected to reduce lead times and costs, and improve quality of the work.

Fabricom will join Total in project management, detail engineering, work preparation, procurement, prefabrication, offshore installation, and precommissioning. "Total E&P Nederland retains the responsibility for the studies and basic engineering as well as the purchase of specific materials," it added.

Fabricom signed a maintenance contract for the same platforms in July 2007. ✦

Processing — *Quick Takes*

Iraq refinery fire kills one, injures 15

One worker was killed and 15 others injured when a fire broke out at Iraq's largest refinery in Baiji, Salahudin province, just 200 km north of Baghdad.

A spokesman for the oil ministry could not say when the fire was likely to be extinguished or production expected to resume.

The fire was ignited by an explosion at the refinery's cooking gas unit, but the spokesman said it was too soon to tell if the explosion was the result of an accident or not.

Baiji has been the focus in recent months of violent attacks by suspected fighters belonging to the al-Qaeda terrorist organization.

News of the fire coincided with claims by Iraq's militant Ansar al-Islam Group that it was responsible for three attacks on US forces and an oil pipeline during Dec. 20 to Jan. 2.

The group, which has ties to al-Qaeda, said it blew up an oil pipeline in the Zammar area of north Mosul on Jan. 1.

Marathon lets contract for Detroit plant expansion

Marathon Oil Corp. has let an integrated engineering, procurement, and construction contract to Fluor Corp., Irving, Tex., for its projected $1.9 billion expansion and upgrade of the company's Detroit, Mich., refinery.

The $1.6 billion EPC contract includes services, the value of procured materials, and the construction contracts under Fluor's direct management. The full EPC contract value will be booked in the fourth quarter of 2007.

With completion of this project, Fluor will have assisted Marathon in increasing the Detroit refinery's heavy oil processing capacity, including Canadian bitumen blends, by about 80,000 b/d. Total refining capacity will increase to 115,000 b/d from 100,000 b/d.

Construction is expected to begin within the next few months and the project is expected to reach completion in late 2010, adding more than 400,000 gpd of transportation fuels to market.

Star Petroleum lets contract for Thai jet fuel plant

Star Petroleum Refining Co. Ltd. let a $60 million contract to CB&I, The Woodlands, Tex., to build a jet fuel processing plant and related storage and shipping systems in Rayong Province, Thailand.

The scope of work includes engineering, procurement, fabrication, and construction of a Jet Merox plant to treat and sweeten jet fuel with a capacity of 20,000 b/d. Also included are associated process facilities, four 100,000-bbl jet fuel storage tanks, and pipeline sendout and marine facilities.

CB&I also is contracted to build an oil and diesel storage system, which includes a 160,000-bbl diesel storage tank, a 750,000-bbl oil storage tank, and all of the associated piping and mechanical work.

The full project is scheduled for completion by early 2009. Star Petroleum is a joint venture of Chevron Corp. and PTT PCL. ✦

ExxonMobil planning a floating LNG terminal

ExxonMobil Corp. plans to seek regulatory approval for BlueOcean Energy, a floating LNG receiving terminal that will help boost natural gas supplies to New Jersey and New York.

The project, estimated to cost more than $1 billion, will have the capacity to supply 1.2 bcfd. The terminal is expected to be moored in 150 ft of water about 30 miles off Long Island. The terminal would be away from shipping lanes, ports, and recreational areas.

With several years required for permitting, engineering, and construction, BlueOcean Energy is expected to begin service around 2015.

Plans call for a subsea pipeline to deliver gas to New Jersey and New York markets. No pipeline route has been selected, although initial plans involve a crossing in New Jersey's Raritan Bay.

The floating terminal is designed to receive LNG supplies from double-hulled LNG vessels about twice a week. The LNG will be stored inside insulated tanks within the terminal's double hull.

BlueOcean Energy is at the start of a lengthy, rigorous permitting process involving state and federal agencies and the public. The US Maritime Administration and the US Coast Guard are the agencies that review terminal plans under the Deepwater Port Act.

In addition to BlueOcean Energy, ExxonMobil is involved in three other terminal projects. Receiving terminals are under construction near Sabine Pass, Tex.; in Wales; and in the Adriatic Sea off Italy.

BlueOcean Energy has commissioned former New Jersey Atty. Gen. John Farmer, a security expert and senior counsel to the 911 Commission, to conduct a safety and security assessment of the proposed facility.

Pipeline outlet eyed for Rubiales heavy oil

Rubiales heavy oil field in Colombia's Los Llanos Orientales area could have a 170,000 b/d pipeline outlet by late 2009.

Petro Rubiales Energy Corp., Vancouver, BC, signed a memorandum of understanding with Colombia's state-owned Ecopetrol for construction of a 230-km, 24-in. pipeline costing more than $300 million that will transport oil from Rubiales and Piriri fields in the Meta Department to the Casanare station for transshipment to the Oleoducto Central SA (Ocensa) pipeline. Petro Rubiales will build another pipeline branch to the Cusiana station.

Interests in the project are to be Ecopetrol 65% and Petro Rubiales 35%. Capacity is expandable to 260,000 b/d to accomodate further developments and exploration in coming years, Petro Rubiales said.

Qatargas delivers first LNG via its Q-Flex vessels

Qatargas has delivered its first shipment of LNG using one of its chartered Q-Flex vessels.

The Al Gattara left Doha on Dec. 3 and arrived at Tohoku Electric Power Co.'s terminal in northern Japan, completing her maiden cargo voyage without incident, said Ahmed Al Khulaifi, chief operating officer for shipping.

The newly designed Q-Flex vessels have on-board liquefaction capacity and about 40% lower energy requirements and carbon emissions than conventional vessels due to the economies of scale created by their size and the efficiency of their engines.

Qatar Gas Transport Co. Ltd. and OSG International Inc. jointly own the Al Gattara, which Qatargas has chartered on a long-term basis.

Meanwhile, Qatargas has signed a supply contract for 700,000 tonnes/year of LNG from the Qatargas 2 venture to be shipped starting in 2009 to Mexican power company Total Gas & Power.

The LNG will be supplied from Qatargas 2's Train 5, which is expected to come on stream in 2009, supplying Mexico's Altamira terminal and opening a new market for Qatari LNG's 31 million tonnes/year exports.

Nexus secures tanker, first loan for Crux

Nexus Energy Ltd., Melbourne, has secured a tanker to be converted into a floating production, storage, and offloading vessel and a $50 million (Aus.) bank loan to kick-start its proposed Crux liquids project in the Browse basin off Western Australia.

Vanguard Oil & Gas International is purchasing the MV Ishwari to convert into an FPSO for use at Crux, Nexus said.

This follows a July 2007 memorandum of understanding among Nexus, Vanguard, and Viking Shipping that established an engineering design and equipment procurement program leading to the expected sanction of the Crux project during third-quarter 2008 with a production start-up of mid-2010.

Design work includes a gas processing plant to be incorporated onto the topsides of the vessel and a weather-vaning turret and mooring system.

The vessel is described as a high quality, well-maintained Suezmax class oil tanker with a double hull that was built in South Korea in 1991.

Thome Offshore Management, Singapore, will manage the Ishwari during trading prior to conversion and will serve as subcontractor to Vanguard for the vessel's life extension, conversion, operation, and maintenance in the field.

The Early Stage Project Finance Development Facility is being provided by the Bank of Scotland International (Australia). The funds will be applied to drilling costs for the current Crux-3 and Crux-4 wells.

Nexus says the Crux-3 well has intersected 150 m of high quality net pay over a 300 m gross vertical gas column that includes a fourth reservoir zone not previously confirmed in the field.

Pressure data in this and previous wells indicate the gas sands in each formation (Montara formation, Plover formation and Nome formation A & B sands) are in pressure communication across the field and form part of a single accumulation. This is expected to simplify the development plan.

Nexus has an 85% stake in AC/P23, which contains Crux, with Osaka Gas holding 15%. Nexus also holds a 50% interest in adjoining AC/P41, with Shell holding the other 50%, which contains similar exploration prospects. ✦

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Letters

Peak-oil concerns

I attended the Association for the Study of Peak Oil 2007 World Oil Conference that was held in Houston not too long ago (OGJ, Nov. 26, 2007, p. 22). The conference only drew 525 attendees. I find it alarming that only 525 people are concerned with the reality that world oil production will soon peak and then ultimately start declining. Some at the conference argued that peak production has already occurred, while others forecast a peak to occur in 2040. The fact is, it doesn't really matter exactly when peak oil production happens as long as we can all agree that peak oil production will happen, and when it does, the lifestyles of most people in the US will change forever.

The United States has 5% of the world's population yet consumes 25% of the world's oil. Twenty years ago the United States imported 30% of its oil. Today we import 68% of our oil with most of it coming from Canada, Saudi Arabia, Mexico, Venezuela, and Nigeria. Canada's oil production is in decline, and so is Mexico's. Venezuela has a whacky dictator, and Nigeria continues to have civil unrest. Lastly, Saudi Arabia's oil production could be in decline, but no one knows for sure because the Saudis aren't talking. When you factor in China and India's increasing thirst for oil, it doesn't take a fifth grader to tell you that demand will soon overtake supply if it hasn't already.

When Matt Simmons [chairman, Simmons & Co. International, Houston] spoke at the ASPO conference, he noted that there were only 3.1 million hits on Google for "peak oil" vs. 80.5 million hits for "global warming." How can an issue that will ultimately affect the way we live, the way we work, the way we travel, and indeed the quality of life for future generations to come, be of such little importance? I applaud the work of ASPO and similar organizations that strive to educate the public on such a complicated subject. I look forward to the 2008 World Oil Conference and only hope that we can at least double the 2007 attendance.

Jeffrey R. Hughes, President
HTK Consultants
Houston

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.

2008

JANUARY

Middle East Petrotech Conference and Exhibition, Bahrain, +60 3 4041 0311, +60 3 4043 7241 (fax), e-mail: mep@oesallworld.com, website: www.allworldexhibitions.com/oil. 14-16.

World Future Energy Summit, Abu Dhabi, +971 2 444 6011, +971 2 444 3987 (fax), website: www.wfes08.com. 21-23.

API Exploration & Production Winter Standards Meeting, Ft. Worth, Tex., (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 21-25.

API/AGA Oil & Gas Pipeline Welding Practices Meeting, Ft. Worth, Tex., (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 23-25.

International Forum Process Analytical Technology (IFPAC), Baltimore, (847) 543-6800, (847) 548-1811 (fax), e-mail: info@ifpacnet.org, website: www.ifpac.com. 27-30.

SPE/IADC Managed Pressure Drilling & Underbalanced Operations Conference & Exhibition, Abu Dhabi, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 28-29.

Offshore West Africa Conference & Exhibition, Abuja, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.offshorewestafrica.com. 29-31.

Petroleum Exploration Society of Great Britain Geophysical Seminar, London, +44 (0)20 7408 2000, +44 (0)20 7408 2050 (fax), e-mail: pesgb@pesgb.org.co.uk, website: www.pesgb.org.uk. 30-31.

SIHGAZ International Hydrocarbon and Gas Fair, Hassi Messaoud, Algeria, website: www.sihgaz2008.com. Jan. 30-Feb. 3.

FEBRUARY

Middle East Corrosion Conference, Bahrain, + 973 17 729819, + 973 17 7299819 (fax), e-mail: bseng@batelco.com.bh, website: www.mohandis.org. 3-6.

IADC Health, Safety, Environment & Training Conference & Exhibition, Houston, (713) 292-1945, (713) 292-1946 (fax), e-mail: conferences@iadc.org, website: www.iadc.org. 5-6.

SPE Unconventional Reservoirs Conference, Keystone, Colo., (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 10-12.

International Pipeline Pigging & Integrity Management Conference & Exhibition, Houston, (713) 521-5929, (713) 521-9255 (fax), e-mail: clarion@clarion.org, website: www.clarion.org. 12-14.

Deep Offshore Technology International Conference & Exhibition, Houston, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.dotinternational.net. 12-14.

SPE International Formation Damage Control Symposium & Exhibition, Lafayette, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 13-15.

Alternative Fuels Technology Conference, Prague, +44 (0) 20 7357 8394, +44 (0) 20 7357 8395 (fax), e-mail: Conferences@EuroPetro.com. website: www.europetro.com. 18.

IP Week, London, +44 (0)20 7467 7100, +44 (0)20 8561 0131 (fax), e-mail: events@energyinst.org.uk, website: www.ipweek.co.uk. 18-21.

International Catalyst Technology Conference, Prague, +44 (0) 20 7357 8394, +44 (0) 20 7357 8395 (fax), e-mail: Conferences@EuroPetro.com. website: www.europetro.com. 19-20.

Pipe Line Contractors Association Annual Conference (PLCA), Maui, (214) 969-2700, (214) 969-2705 (fax), e-mail: plca@plca.org, website: www.plca.org. 20-24.

International Petrochemicals & Gas Technology Conference & Exhibition, Prague, +44 (0) 20 7357 8394, +44 (0) 20 7357 8395 (fax), e-mail: Conferences@EuroPetro.com. website: www.europetro.com. 21-22.

AAPG Southwest Section Meeting, Abilene, Tex., (918) 560-2679, (918) 560-2684 (fax), e-mail: convene@aapg.org, website: www.aapg.org. 24-27.

Laurance Reid Gas Conditioning Conference, Norman, Okla., (405) 325-3136, (405) 325-7329 (fax), e-mail: bettyk@ou.edu, website: www.lrgcc.org. 24-27.

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. 25-26.

CERI Natural Gas Conference, Calgary, Alta., (403) 220-2380, (403) 284-4181 (fax), e-mail: jstaple@ceri.ca, website: www.ceri.ca. 25-26.

SPE Intelligent Energy Conference & Exhibition, Amsterdam, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 25-27.

IADC Drilling HSE Asia Pacific Conference & Exhibition, Kuala Lumpur, (713) 292-1945, (713) 292-1946 (fax), e-mail: conferences@iadc.org, website: www.iadc.org. 26-27.

Middle East Fuels Symposium, Abu Dhabi, +44 (0) 1242 529 090, +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. 27-28.

MARCH

GPA Annual Convention, Grapevine, Tex., (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@gasprocessors.com, website: www.gasprocessors.com. 2-5.

GEO Middle East Geosciences Conference & Exhibition, Bahrain, +44 20 7840 2139, +44 20 7840 2119 (fax), (fax), e-mail: geo@oesallworld.com, website: www.allworldexhibitions.com. 3-5.

Subsea Tieback Forum & Exhibition, Galveston, Tex., (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.subseatiebackforum.com. 3-5.

Calendar

NPRA Security Conference, The Woodlands, Tex., (202) 457-0480, (202) 457-0486 (fax), e-mail: info@npra.org, website: www.npradc.org. 4-5.

ARTC Annual Meeting, Bangkok, +44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. 4-6.

Global Petrochemicals Annual Meeting, Dusseldorf, +44 (0) 1242 529 090, +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. 4-6.

IADC/SPE Drilling Conference & Exhibition, Orlando, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 4-6.

SPE Indian Oil & Gas Technical Conference & Exhibition, Mumbai, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 4-6.

Annual Middle East Gas Summit, Doha, +971 4 336 2992, +971 4 336 0116 (fax), e-mail: sarita.singh@ibc-gulf.com, website: www.ibcgulfconferences.com. 5-6.

NPRA Annual Meeting, San Diego, (202) 457-0480, (202) 457-0486 (fax), e-mail: info@npra.org, website: www.npradc.org. 9-11.

World Heavy Oil Congress, Edmonton, Alta., (403) 209-3555, (403) 245-8649 (fax), website: www.petroleumshow.com. 10-12.

New Zealand Petroleum Conference, Auckland, +64 3 962 6179, +64 4 471 0187 (fax), e-mail: crown.minerals@med.govt.nz, website: www.crownminerals.govt.nz. 10-12.

Gastech International Conference & Exhibition, Bangkok, +44 (0) 1737 855005, +44 (0) 1737 855482 (fax), e-mail: tonystephenson@dmgworldmedia.com, website: www.gastech.co.uk. 10-13.

API Spring Petroleum Measurement Standards Meeting, Dallas, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 10-14.

European Fuels Conference & Annual Meeting, Paris, +44 (0) 1242 529 090, +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. 11-12.

IADC International Deepwater Drilling Conference & Exhibition, Rio de Janeiro, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 11-12.

SPE North Africa Technical Conference & Exhibition, Marrakech, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 12-14.

NACE International Conference & Expo, New Orleans, (281) 228-6200, (281) 228-6300 (fax), website: www.nace.org. 16-20.

Offshore Asia Conference & Exhibition, Kuala Lumpur, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.offshoreasiaevent.com. 17-19.

Sub-Saharan Oil, Gas & Petrochemical Exhibition & Conference, Cape Town, +27 21 713 3360, +27 21 713 3366 (fax), e-mail: expo@fairconsultants.com, website: www.fairconsultants.com. 17-19.

Turoge and Black Sea Oil & Gas Exhibition & Conference, Ankara, +44 207 596 5016, e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 18-20.

AAPG Prospect & Property Expo (APPEX), London, (918) 560-2679, (918) 560-2684 (fax), e-mail: convene@aapg.org, website: www.aapg.org. 24-26.

AAPG Pacific Section Meeting, Bakersfield, Calif., (918) 560-2679, (918) 560-2684 (fax), e-mail: convene@aapg.org, website: www.aapg.org. Mar. 29-Apr. 2.

NPRA International Petrochemical Conference, San Antonio, (202) 457-0480, (202) 457-0486 (fax), e-mail: info@npra.org, website: www.npradc.org. Mar. 30-Apr. 1.

SPE Middle East Petroleum Engineering Colloquium, Dubai, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. Mar. 30-Apr. 2.

PIRA Understanding Global Oil Markets Conference, Tokyo, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. Mar. 31-Apr. 1.

ERTC Sustainable Refining Conference, Brussels, +44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. Mar. 31–Apr. 2.

APRIL

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. 1-2.

ERTC Biofuels+ Conference, Brussels, +44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. 2-4.

GIOGIE Georgian International Oil & Gas Conference & Showcase, Tbilisi, +44 207 596 5016, e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 3-4.

Middle East Petroleum & Gas Conference, Doha, +65 6222 0230, +65 6222 0121 (fax), e-mail: mpgc@cconnection.org, website: www.cconnection.org. 6-8.

ACS National Meeting & Exposition, New Orleans, 1 (800) 227-5558, e-mail: natlmtgs@acs.org, website: www.acs.org. 6-10.

American Institute of Chemical Engineers (AIChE) Spring National Meeting, New Orleans, (212) 591-8100, (212) 591-8888 (fax), website: www.aiche.org. 6-10.

CIOGE China International Oil & Gas Conference, Beijing, + (44) 020 7596 5000, + (44) 020 7596 5111 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 7-8.

API Pipeline Conference & Cybernetics Symposium, Orlando, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 7-10.

EAGE Saint Petersburg International Conference & Exhibition, Saint Petersburg, +7 495 9308452, +7 495 9308452 (fax), e-mail: eage@eage.ru, website: www.eage.nl. 7-10.

IADC Well Control Europe Conference & Exhibition, Amsterdam, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 9-10.

ENTELEC Annual Conference & Expo, Houston, (888) 503-8700, website: www.entelec.org. 9-11.

North Caspian Regional Atyrau Oil & Gas Exhibition & Petroleum Technology Conference, Atyrau, +44 207 596 5016, e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 9-11.

API Spring Refining & Equipment Standards Meeting, New Orleans, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 14-16.

API/NPRA Spring Operating Practices Symposium, New Orleans, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 15.

SPE Gas Technology Symposium, Calgary, Alta., (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 15-17.

SPE International Health, Safety & Environment Conference, Nice, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 15-17.

GPA Midcontinent Annual Meeting, Okla. City, (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@gasprocessors.com, website: www.gasprocessors.com. 17.

AAPG Annual Convention & Exhibition, San Antonio, 1 (888) 945 2274, ext. 617, (918) 560-2684 (fax), e-mail: convene@aapg.org, website: www.aapg.org/sanantonio. 20-23.

SPE Improved Oil Recovery Symposium, Tulsa, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 20-23.

ERTC Coking & Gasification Conference, Rome, +44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. 21-23.

WestAsia Oil, Gas, Refining, & Petrochemicals Exhibition & Conference, Oman, +968 24790333, +968 24706276 (fax), e-mail: clemento@omanexpo.com, website: www.oqwaexpo.com. 21-23.

International Pump Users Symposium, Houston, (979) 845-7417, (979) 847-9500 (fax), website: http://turbolab.tamu.edu. 21-24.

SPE Progressing Cavity Pumps Conference, Houston, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 27-29.

MAY

IOGCC Midyear Meeting, Calgary, Alta., (405) 525-3556, (405) 525-3592 (fax), e-mail: iogcc@iogcc.state.ok.us,

website: www.iogcc.state.ok.us. 4-6.

PIRA Canadian Energy Conference, Calgary, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 5.

API International Oil Spill Conference, Savannah, Ga., (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 5-8.

Offshore Technology Conference (OTC), Houston, (972) 952-9494, (972) 952-9435 (fax), e-mail: service@otcnet.org, website: www.otcnet.org. 5-8.

GPA Permian Basin Annual Meeting, Odessa, Tex., , (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@gasprocessors.com, website: www.gasprocessors.com. 6.

PIRA Understanding Global Oil Markets Conference Calgary, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 6-7.

ERTC Asset Maximization Conference, Lisbon, +44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. 12-14.

International School of Hydrocarbon Measurement, Oklahoma City, (405) 325-1217, (405) 325-1388 (fax), e-mail: lcrowley@ou.edu, website: www.ishm.info. 13-15.

Uzbekistan International Oil & Gas Exhibition & Conference, Tashkent, +44 207 596 5016, e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 13-15.

NPRA National Safety Conference, San Antonio, (202) 457-0480, (202) 457-0486 (fax), e-mail: info@npra.org, website: www.npradc.org. 14-15.

IADC Drilling Onshore America Conference & Exhibition, Houston, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 15.

SPE Digital Energy Conference, Houston, (972) 952-9393, (972) 952-9435 (fax), e-mail: service@spe.org, website: www.spe.org. 20-21.

Mediterranean Offshore Conference & Exhibition (MOC), Alexandria, Egypt, + 39 0761 527976, + 39 0761 527945 (fax), e-mail: st@ies.co.it, website: www.moc2008.com. 20-22.

NPRA Reliability & Maintenance Conference & Exhibition, San Antonio, (202) 457-0480, (202) 457-0486 (fax), e-mail: info@npra.org, website: www.npradc.org. 20-23.

Society of Professional Well Log Analysts (SPWLA) Annual Symposium, Edinburgh, (713) 947-8727, (713) 947-7181 (fax), website: www.spwla.org. 25-28.

Middle East Refining and Petrochemicals Conference & Exhibition, Bahrain, +973 1755 0033. +973 1755 3288 (fax), e-mail: mep@oesallworld.com, website: www.allworldexhibitions.com. 26-28.

SPE International Oilfield Corrosion Conference, Aberdeen, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 27.

SPE International Oilfield Scale Conference, Aberdeen, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 28-29.

JUNE

ERTC Management Forum, Copenhagen, +44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. 2-4.

Caspian Oil & Gas Exhibition & Conference, Baku, +44 207 596 5016, e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 3-6.

Oklahoma Independent Petroleum Association (OIPA) Annual Meeting, Dallas, (405) 942-2334, (405) 942-4636 (fax), website: www.oipa.com. 6-10.

PIRA Scenario Planning Conference, London, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 9.

Asian Geosciences Conference & Exhibition, Kuala Lumpur, +44 (0) 20 7862 2136. +44 (0) 20 7862 2119, e-mail: geoasia@oesallworld.com, website: www.geo-asia.com. 9-11.

Independent Liquid Terminals Association (ILTA) Annual Operating Conference & Trade Show, Houston, (202) 842-9200, (202) 326-8660 (fax), e-mail: info@ilta.org, website: www.ilta.org. 9-11.

SPE Tight Gas Completions Conference, San Antonio, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 9-11.

EAGE/SPE EUROPEC Conference & Exhibition, Rome, +31 30 6354055, +31 30 6343524 (fax), e-mail: eage@eage.org, website: www.eage.nl. 9-12.

ASME Turbo Expo, Berlin, (973) 882-1170, (973) 882-1717 (fax), e-mail: infocentral@asme.org, website: www.asme.org. 9-13.

PIRA London Energy Conference, London, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 10.

Global Petroleum Show, Calgary, Alta., (403) 209-3555, (403) 245-8649 (fax), website: www.petroleumshow.com. 10-12.

IADC World Drilling Conference & Exhibition, Berlin, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 11-12.

PIRA Understanding Global Oil Markets Conference, London, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 11-12.

Asian Gas Technology (GTA) Exhibition, Kuala Lumpur, +44 20 7840 2136, +44 20 7840 2119 (fax), e-mail: aridgway@oesallworld.com, website: www.gastechnologyasia.com. 11-13.

CIPC/SPE GTS Joint Conference, Calgary, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 16-19.

American Association of Professional Landmen (AAPL) Annual Meeting, Chicago, (817) 847-7700, (817) 847-7704(fax), e-mail: aapl@landman.org, website: www.landman.org. 18-21.

LNG North America Summit, Houston, (416) 214-3400, (416) 214-3403 (fax), website: www.lngevent.com. 19-20.

March 3 – 5, 2008 / Moody Gardens Hotel & Convention Center, Galveston, Texas

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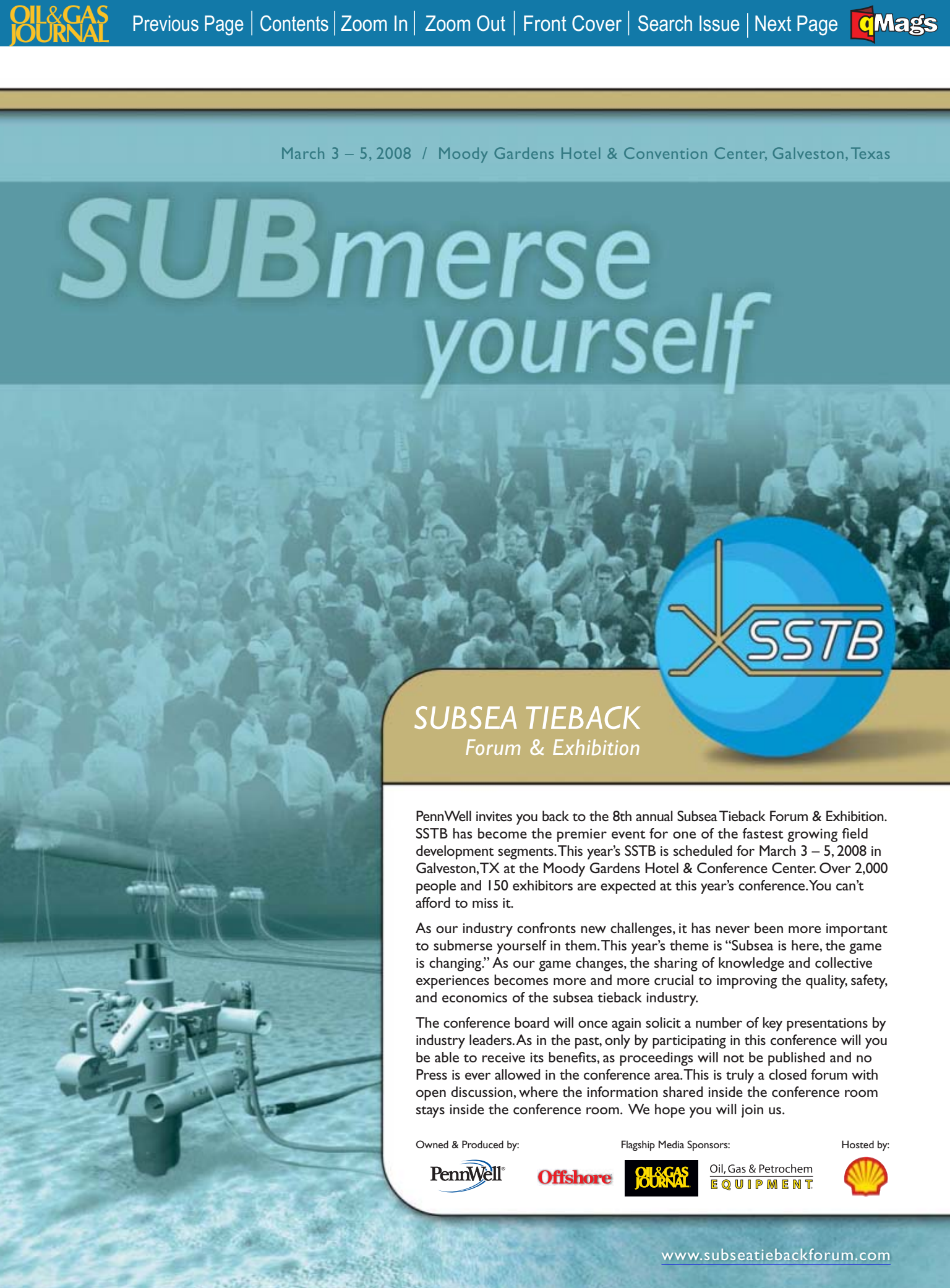

SSTB

SUBSEA TIEBACK
Forum & Exhibition

PennWell invites you back to the 8th annual Subsea Tieback Forum & Exhibition. SSTB has become the premier event for one of the fastest growing field development segments. This year's SSTB is scheduled for March 3 – 5, 2008 in Galveston, TX at the Moody Gardens Hotel & Conference Center. Over 2,000 people and 150 exhibitors are expected at this year's conference. You can't afford to miss it.

As our industry confronts new challenges, it has never been more important to submerse yourself in them. This year's theme is "Subsea is here, the game is changing." As our game changes, the sharing of knowledge and collective experiences becomes more and more crucial to improving the quality, safety, and economics of the subsea tieback industry.

The conference board will once again solicit a number of key presentations by industry leaders. As in the past, only by participating in this conference will you be able to receive its benefits, as proceedings will not be published and no Press is ever allowed in the conference area. This is truly a closed forum with open discussion, where the information shared inside the conference room stays inside the conference room. We hope you will join us.

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Journally Speaking

OGJ's news mainstays

Bob Tippee
Editor

A new information service illustrates three mainstays of Oil & Gas Journal's approach to news.

It's targeted. It's electronic. And it's authoritative.

The new service is OGJ Washington Pulse. You can find it by clicking the appropriately labeled link in the gray navigation bar on the left side of the OGJ Online home page (www.ogjonline.com).

On the OGJWP main page, you'll find a number of articles in several departments plus an archive of stories written in previous weeks.

Articles go online as they're written and edited. Each Thursday, all items written since the prior Thursday are assembled into a dated newsletter that can be downloaded from the "Archive" area and printed.

In a few weeks, only OGJWP subscribers will be able to open current articles and archived newsletters.

Key differences

As the name implies, OGJWP offers oil and gas news from the US capital. But it differs from its parent in the same way that OGJ differs from other news sources.

The difference is the target audience. OGJ addresses operational decision-makers in the oil and gas business—engineers, geoscientists, and top managers.

To OGJ's audience, even outside the US, Washington news is important. Laws, regulations, and proposals in the world's biggest energy-consuming country and fifth-largest oil producer affect the oil and gas business far beyond US boundaries.

So OGJ has covered Washington for decades. But it has aimed its Washington coverage at professionals busy with industry operations—people affected by but not directly involved with energy politics. The focus is on consequences rather than processes.

OGJWP reports the processes. It covers politics shaping legislative and regulatory proposals for readers with direct professional interests in all the personalities and maneuvering that are involved.

OGJWP thus covers political and procedural details that OGJ would omit for its busy, operationally oriented readers, just as OGJ in turn pursues and reports operational and technical details that a general-interest newspaper would leave out of coverage of the same story.

That difference, the targeting of coverage to a specialist audience, is the essence of news at OGJ.

Equally important to OGJ news is electronic delivery. Since 2002, OGJ has gone to its web site first with short, timely news items and followed up in the printed magazine. Doing so helps OGJ recapture the timeliness it sometimes sacrifices while editors pursue those operational details others omit and scrub from stories the fluff that fills so many web pages these days.

Also like the parent, OGJ's Washington offspring writes and edits from a strong foundation of industry knowledge and experience. OGJWP's editor is veteran Washington energy reporter Nick Snow.

OGJ readers know Snow's work. He has been the magazine's Washington correspondent and Watching Government columnist since September 2004. Until joining the staff full-time last October, he also worked part-time as a copy editor at the Washington Post.

During 1993-2002, Snow was editor of Petroleum Finance Week and for many years before that held editorial positions at the Oil Daily. He started in journalism at the Deseret News in Salt Lake City.

Snow holds a journalism degree from the University of Utah and in 1977 studied at Stanford University as an Energy Fellow, Professional Journalism Fellowships (now John S. Knight Fellowships).

Right combination

Snow knows how to write for savvy readers. He works fast in multimedia formats. And he knows the oil and gas business.

To anyone at OGJ or who knows OGJ, that's the right combination. Let us know what you think of his work. ✦

Editorial

Candidates and energy

As candidate selection began in the US presidential campaign, two inaugural events yielded different winners for each of the two main political parties. Victors of the Iowa caucuses and New Hampshire primary elections can be called frontrunners in their parties' races for nomination—but not to the exclusion of candidates concentrating their efforts elsewhere. At this point, no one can know who will lead his or her party's ticket in November.

For the oil and gas industry, however, it's not too soon to take note of how the early winners approach energy. While campaign positions often differ from those presidents adopt once in office, clear patterns are emerging.

Similar platforms

The Democrats offer similar energy platforms. Sens. Hillary Clinton of New York and Barack Obama of Illinois both would commit the federal government to spending $150 billion over 10 years on energy, reducing emissions of greenhouse gases, and expanding mandates for fuel ethanol.

Clinton, who won in New Hampshire, would start the energy-spending spree with $50 billion funded partly by new taxes on oil and gas companies. According to her campaign web site, she would require that 25% of US electricity come from renewable energy by 2025 and that 60 billion gal of "home-grown biofuels" be available for vehicle use by 2030. The energy bill enacted in December increases the mandate for renewable vehicle fuel to 36 billion gal in 2022.

Clinton also would increase vehicle fuel efficiency standards to 55 mpg by 2030 from the target set by the new energy bill of 35 mpg by 2020. The New York senator proposes a cap-and-trade system targeting reductions in carbon emissions from 1990 levels of 80% by 2050. She hopes to cut oil imports by 10 million b/d from projected 2030 levels.

Obama, the Iowa winner, doesn't mention tax hikes on oil and gas as a funding source for the $150 billion "investment" he proposes in biofuels, plug-in hybrid vehicles, renewable energy, low-emission coal plants, and a digital electricity grid. His web site says he would create a venture capital fund to invest, in partnership with other investment funds and national laboratories, $10 billion/year for 5 years in "clean technologies." He would impose renewable-source mandates for power generation and vehicle fuel equal to those proposed by Clinton. Requiring "fuels suppliers to reduce the carbon their fuel emits by 10% by 2020," Obama also would double vehicle fuel economy standards from an unspecified base within 18 years. He would seek the same oil-import cuts as Clinton.

Former Arkansas Gov. Mike Huckabee, the Republican winner in Iowa, emphasizes energy independence, calling submission of a "comprehensive plan" to Congress "the first thing I will do as president." But the energy platform on his campaign web site contains more rhetoric than specific proposals. "We have to explore, we have to conserve, and we have to pursue all avenues of alternative energy: nuclear, wind, solar, hydrogen, clean coal, biodiesel, and biomass," it says. The web site mentions a federal research and development budget to be "matched by the private sector" for alternative fuels, among which, it adds, markets would determine what makes economic sense.

'Common sense'

From Sen. John McCain of Arizona, the Republican winner in New Hampshire, energy so far has received little attention except in relation to climate change, to which he advocates strong response. According to his web site, McCain "has offered common sense approaches to limit carbon emissions by harnessing market forces that will bring advanced technologies, such as nuclear energy, to the market faster, reduce our dependence on foreign supplies of energy, and see to it that America leads the way that ensures all nations do their rightful share." McCain opposed the Energy Policy Act of 2005 in part because of the ethanol mandate it imposed but now says ethanol makes sense because oil prices have risen.

On one important issue, only one of these four candidates shows sensible concern for energy supply. Huckabee alone supports leasing of the Arctic National Wildlife Refuge coastal plain. All three senators have voted to ban drilling there. ✦

Association executives expect more energy legislative battles

Nick Snow
Washington Editor

When US President George W. Bush signed HR 6, the Energy Independence and Security Act, into law on Dec. 19, 2007, he called it an example of what can be accomplished when Congress and his administration worked together. The bill that arrived at his desk actually was a survivor of several confrontations, including a threatened presidential veto until Senate leaders removed provisions for new taxes.

Administration and congressional leaders nevertheless basked in their accomplishment for a few hours. Then they resumed fighting when the US Environmental Protection Agency said California and other states could not adopt tougher greenhouse gas emission controls than the agency's new national standards.

It was not surprising that the White House and Congress often were at odds over energy strategies during 2007 after Democrats assumed control of both the House and Senate in early January. House Speaker Nancy Pelosi (D-Calif.) included energy in the bills passed during the first 100 hr of work that month. Congressional Democrats on both sides of the Capitol pushed bills designed to stop alleged gasoline price gouging and repeal 2005 Energy Policy Act incentives they considered oil and gas industry giveaways. But when they finally sent the 2007 energy bill to the White House for Bush's signature, it raised automotive fuel efficiency requirements, increased the federal ethanol mandate, and established new consumer lighting and other appliance efficiency standards.

Several House and Senate Democrats have said they will reintroduce proposals that were not adopted in 2007 because the changes are still needed. Now that they have had a full year of working with a Congress where the Democrats are back in the majority following 12 years of Republican control, oil and gas industry associations and their leaders have a better idea of what they are facing. Their assessments of 2008's prospects range from guardedly hopeful to warily grim.

'Better understanding'

"We're beginning to see a better understanding that taxing the oil and gas industry punitively for its own sake is counterproductive in many ways," American Petroleum Institute Pres. Red Cavaney observed. He listed three main reasons: The industry reinvests heavily in its business, consumers feel new taxes because they are simply passed through, and taxing an industry with a proven record to fund new technologies is risky because there's no guarantee that such investments will be as productive.

Cavaney also suggested that federal lawmakers and their staffs increasingly recognize the massive role that hydrocarbons play in the nation's energy mix, and that alternatives, even growing at supersonic speeds, won't be able to take their place for several decades. "They're beginning to understand that energy is not a pure political football. It has real effects on real people. We need to get serious about creating a stable energy security framework," he said.

William F. Whitsitt, president of the American Exploration & Produc-

tion Council, said much of the initial congressional activity during the 110th Congress's first session reflected Democrats' pent-up agenda frustration. "By not being in charge for so long, we saw a very partisan, very intense release of that frustration when they regained control, particularly in the House. With these energy bills and HR 6, the Democratic leadership exercised surprising strength in keeping its members in line. In most votes, fewer than 11 Democrats broke ranks over punitive legislation," he said.

"With this latest energy bill, some of that frustration may have subsided. While the leadership still exercised discipline, we may have seen the first indication that it recognizes there needs to be decent policy among the politics. That makes me hope, going into 2008, that we might have some breathing room," Whitsitt continued.

'Year of the attack'

"This has been the year of the attack," National Petrochemical & Refiners Association Pres. Charles T. Drevna said of 2007. "It made great political gamesmanship to use the refining, oil, and gas industries as targets. Fortunately, most of the punitive legislation did not have the votes to be enacted. Fortunately, rational behavior arrived."

That did not apply to the ethanol mandate in the final energy bill, he continued. "It's unrealistic and fraught with potential unintended consequences that haven't been fully investigated. Its timeframe may be unrealistic and difficult to achieve. It clearly will have the biggest impact on gasoline quality and quantity in the near future. We don't consider it consumer-friendly," he said.

"This has been the year of the attack. It made great political gamesmanship to use the refining, oil, and gas industries as targets."
—NPRA Pres. Charles T. Drevna

Cavaney pointed out that when the federal renewable fuel standard was enacted as part of the 2005 Energy Policy Act, the refining industry knew it had the capacity to make the product to meet the goals. "This new structure is not the same. To reach these higher numbers means relying on processes that haven't worked yet on a production-size operation. We think there will need to be periodic technology reviews and time-outs if the volumes don't materialize. The latest bill doesn't have that kind of language," he told OGJ.

"The only reason the oil and gas industry dodged the bullet is that we had a number of Republican friends, particularly in the Senate, said Brian T. Petty, International Association of Drilling Contractors senior vice-president for government affairs. "The leadership is no friend. We'll continue to work with the House's Blue Dog Democrats and similar groups, and try to educate new lawmakers from red states," he said.

Early versions of congressional legislation would have seriously inhibited producers' ability to find oil and gas domestically, Petty said, adding, "But there are other insidious efforts to reduce production, particularly through regulations."

"The only reason the oil and gas industry dodged the bullet is that we had a number of Republican friends, particularly in the Senate."
—Brian T. Petty, IADC senior vice-president, government affairs

Hydraulic fracturing

One of these regulations would place hydraulic fracturing back under federal water regulation control after it was excluded from the Safe Drinking Water Act in 2004 when a study found no discernible effects. This time, industry opponents are trying to bring it under the Clean Water Act's authority by focusing on producer water from coalbed methane, which contributes heavily to domestic natural gas production, Petty said.

The Independent Petroleum Association of America will continue mobilizing its members to communicate with members of Congress and encourage them to develop a progressive energy policy, IPAA Pres. Barry Russell said. But the group also recognizes that many federal lawmakers who have defended the oil and gas industry will retire at the end of 2008, particularly in the Senate, he told OGJ. "We spend a lot of time working with Democrats from producing states and in the Blue Dog Coalition. But decisions are being made by a smaller and smaller group," he said.

Lee O. Fuller, IPAA vice-president of government relations, noted that the 110th Congress so far has relied on the leadership more than committees to develop initiatives, especially in the House. "Many producing-state Democrats are on committees that have jurisdiction. But if those committees don't get to develop policies, it becomes a very difficult problem," he said.

Fortunately, domestic producers

have begun to feel the benefits of EPACT and of the 2006 law which opened significant new Gulf of Mexico acreage to leasing. Accomplishments during 2007 include the US Minerals Management Service's completion of its latest 5-year Outer Continental Shelf leasing plan, which included potential new tracts off Virginia and in Alaska's Bristol Bay as well as the gulf, National Ocean Industries Association Pres. Tom Fry said.

A former director of both BLM and MMS, Fry said new MMS Director Randall Luthi is off to a good start because he recognizes the politics that are a part of the job. "He's trying to make the agency stronger and better able to do the sort of work it has done in the past," Fry said. The next federal OCS sale in March could be big because a number of leases have expired and come back onto the market, he continued. "The only damper has been that MMS has raised the royalty rate twice in the last year," he said.

"Many producing state Democrats are on committees that have jurisdiction. But if those committees don't get to develop policies, it becomes a very difficult problem."

—Lee O. Fuller, IPAA vice-president, government relations

"As we look at changes in the energy economy and climate change, natural gas will have a continuing and increasingly important role."

—INGAA Pres. Donald F. Santa

'900-lb gorilla'

Industry association executives generally agreed that global climate change will increasingly drive energy legislation. "It will be the 900-lb gorilla for 2008 and beyond," said Drevna.

Unfortunately, what we've seen in most proposals is a lot of cost and very little benefit. Until we make that equation much more balanced, the American economy as a whole is in for some sleepless nights.

Donald F. Santa, president of the Interstate Natural Gas Association of America, said, "As we look at changes in the energy economy and climate change, natural gas will have a continuing and increasingly important role. One surprise was the opposition last year to coal in several utility markets. But if the right policies in terms of access to supplies are in place, the gas will be available to meet North American demand, he said.

Martin E. Edwards. INGAA vice-president for legislative affairs, said, "Our greatest challenge is separating natural gas from petroleum policies. I'm not sure that many committee members fully understand the importance of gas supplies and infrastructure." He said the House was more political again than the Senate during 2007, but added that its leadership may tone down the rhetoric and try harder to govern in 2008.

Lawmakers and their staffs are more receptive when producers and refiners bring along consumers when they call. "Some natural gas users have been the most effective energy advocates. It's a totally different dynamic, in a meeting with a consuming state's representative, when a consuming industry from his district is there too," said Whitsitt.

He sees a growing recognition that gas will need to play a key role in reaching a climate change solution, and that more supplies will be needed. "I think a number of members of Congress in both parties finally recognize this. We saw, through conversations with members' staffs, that gas can be a success story or a problem. We plan to get back to basics with producing state Democrats and help them make persuasive arguments," he told OGJ.

Election outlook

Associations and their members also recognize that 2008 is a federal election year. Several are part of the Business and Industry Political Action Committee. Others have their own PACs. Some use

"We ought to welcome a vigorous debate and more visibility. As long as the public continues to demand our products, it will need to become part of the solution and not expect us to solve these problems alone."

—API Pres. Red Cavaney

both. Most of the executives interviewed said they do not expect energy to be the biggest election issue. But they agreed it could be significant.

Cavaney said, "It certainly will be important. I think the next president will have to deal with it. I think every major presidential and vice presidential candidate will have briefing papers on it. I also think candidates for other offices down to the state and local level also will have to deal with it."

"Clearly, there will be a change. The people who are discussing energy with the candidates now in the campaigns could wind up as part of the next administration."

—AEPC Pres. William F. Whitsitt

While the oil and gas industry has acknowledged that it needs to communicate more effectively with external audiences, API's president said a number of its critics still have been able to conduct their operations without much opposition. "When they kept talking and the industry wasn't there, a lot of what they said became accepted truths. We ought to welcome a vigorous debate and more visibility. As long as the public continues to demand our products, it will need to become part of the solution and not expect us to solve these problems alone," Cavaney maintained.

"We'll continue to look at the presidential candidates and reach out to their staffs in this early stage to let them know that natural gas is important." Whitsitt said, "Clearly, there will be a change. The people who are discussing energy with the candidates now in the campaigns could wind up as part of the next administration. We want them to know we're willing to talk to them." ✦

Policymakers to affect North American gas security

Judy R. Clark
Senior Associate Editor

Growth in the international LNG trade will be important in providing natural gas for future Canadian, Mexican, and US markets, but policymakers in those and other countries will actually determine gas supply security in North America, said speakers at the Natural Gas in North America: Markets and Security conference in Houston Nov. 16.

The event was sponsored by the Baker Institute Energy Forum and the Center for Energy Economics at University of Texas and was held at the James A. Baker III Institute for Public Policy at Rice University.

"The future development of the North American natural gas market will be highly influenced by US policy choices and changes in international supply alternatives," reported the Baker Institute in its Policy Report on Natural Gas in North America: Markets and Security. Policy initiatives must include granting access to domestic resources and passing regulations to encourage importation and distribution of gas and LNG from other countries.

US gas demand, imports

US natural gas demand increased to 21.7 tcf by 2006 from16.2 tcf in 1986, representing an average growth of 1.5%/year. Demand is expected to slow, yet grow by 1.3%/year during the next 20 years, according to the Baker report. In 2006, gas represented 22% of total primary energy use in the US. About 19% of the electricity currently generated in the US is gas-fueled, and it accounts for 90% of all new Mw of electricity capacity installed since 1995, primarily because of the efficiencies gained from use of combined-cycle technology in power generation. Gas also fuels 41% of industrial use and 43% of residential use.

Its appeal continues to grow because it is thought to be more secure than oil, cleaner than coal, and competitively priced compared with oil, nuclear power, and renewables. Climate change legislation will affect how much gas is used for future power generation, said Glen Sweetnam of the Department of Energy's Energy Information Administration. However, beyond 2015-20, he said, more coal-fired plants will come on stream as clean coal technology advances. However, he said, "If you don't have clear legislation, but the threat of legislation, investment will be held off, and gas use will increase."

At the same time gas is gaining in popularity, growth in domestic production in the Lower 48 is likely to slow, leading to the need for increased imports. In 2006, the US imported about 20% of the gas it used, 85.7% of that from Canada via pipelines. However Canada's gas needs also are growing, particularly for the production of tar sands in the west, possibly limiting future volumes available for export.

Because of these conditions, imports of gas in the form of LNG are expected to increase substantially, creating supply security concerns and raising questions about appropriate national natural gas policy.

LNG imports in 2006 stood at more

US NATURAL GAS SUPPLY, CONSUMPTION, INVENTORIES

	2007				2008				Year		
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	2006	2007	2008
Supply, bcfd											
Total marketed production	53.32	53.97	54.62	55.00	55.21	54.94	55.11	55.10	53.10	54.23	55.09
Alaska	1.34	1.14	1.23	1.36	1.35	1.21	1.22	1.35	1.22	1.27	1.28
Federal GOM[1]	7.65	7.63	7.38	7.95	8.29	8.23	7.63	8.04	7.79	7.65	8.05
Lower 48 states (excl. GOM)	44.33	45.19	46.02	45.69	45.57	45.49	46.27	45.71	44.09	45.31	45.76
Total dry gas production	51.01	51.58	52.26	52.63	52.83	52.58	52.74	52.73	50.77	51.88	52.72
Gross imports	13.01	12.62	12.31	10.58	11.85	11.86	12.39	12.08	11.47	12.12	12.05
Pipeline	10.96	9.55	9.84	9.51	9.89	9.13	9.51	9.36	9.87	9.96	9.47
LNG	2.05	3.07	2.47	1.06	1.97	2.72	2.88	2.72	1.60	2.16	2.57
Gross exports	2.25	1.87	1.80	1.75	2.19	1.85	1.78	1.87	1.98	1.92	1.92
Net imports	10.75	10.75	10.51	8.82	9.66	10.01	10.61	10.21	9.49	10.21	10.12
Supplemental gaseous fuels	0.20	0.13	0.17	0.17	0.20	0.15	0.17	0.18	0.17	0.17	0.18
Net inventory withdrawals	16.26	–10.63	–7.60	3.75	15.55	–9.77	–8.93	4.13	–1.18	0.39	0.23
Total supply	78.22	51.83	55.34	65.37	78.24	52.97	54.59	67.25	59.25	62.64	63.25
Balancing item[2]	0.60	1.74	1.24	–4.37	0.69	1.29	1.93	–4.51	0.19	–0.21	–0.16
Total primary supply	78.82	53.57	56.22	61.00	78.93	54.27	56.52	62.74	59.44	62.34	63.09
Total consumption, bcfd	78.82	53.57	56.59	61.00	78.93	54.27	56.52	62.74	59.44	62.43	63.09
End-of-period inventories, bcf											
Working gas inventory	1,603	2,580	3,291	2,953	1,538	2,427	3,248	2,868	3,070	2,953	2,868

[1]Market production from US Federal leases. [2]The difference between the sum of the components of natural gas supply and of the sum of the components of gas demand. Note: Minor discrepancies with published historical data are due to independent rounding.
Source: Energy Information Administration/Short-Term Energy Outlook—December 2007

than 500 bcf, and three new import terminals being built on the Gulf Coast with a total send out capacity of more than 5.5 bcfd will enable imports to swell.

The US intends "continued increases in LNG imports," said Katharine Ann Fredriksen, principal deputy assistant secretary for the Office of Policy and International Affairs at the US Department of Energy. The primary US LNG source is Trinidad and Tobago, which provides 66.7%, with Egypt 20.5%, Nigeria 9.8%, and Algeria 3% adding to the supplies.

The Baker report emphasized the importance of securing sufficient LNG in the face of burgeoning demand in other countries such as Mexico, Canada, the European Union, and Asia-Pacific, particularly India and China where demand is expected to increase by 3.5%/year.

Factors important in enabling greater LNG imports will be cooperation between countries in production and trade, Fredriksen said, along with greater interactions among governments and the private sector, and regulatory certainty.

Locked-in gas

Despite the US slowdown in gas production, the US has not run out of gas supplies. Vast unexploited gas resources in Alaska could be piped to the Lower 48, and large potential resources exist off the US Atlantic and Pacific coasts, most of the eastern Gulf of Mexico, and in many sections of the Rocky Mountains, Baker reported.

The US over the last 20 years has removed much acreage from availability to oil and gas exploration companies as leases, dropping from 75% of federal lands available in 1987 to 17% today, it said.

"These [unavailable] areas are estimated to contain more than 125 tcf of natural gas resource, the equivalent of six times US natural gas demand in 2006, reported Baker Institute. "Nearby, Mexico also is home to proven gas reserves of up to 14.6 tcf and an estimated 69.2 tcf of undiscovered gas resource that could be exploited if political barriers to increased investment could be resolved."

The Baker report emphasizes the importance of policymakers' granting to oil and gas producers access to currently locked-up domestic resources, saying the growth of international trade in LNG will greatly impact US energy security, especially when other sources are politically volatile and possibly unpredictable.

Kenneth Medlock, one of the authors of the report and a speaker at the conference, said geopolitics will more and more become part of the energy access issue, and granting access to locked-up domestic supplies would increase US elasticity and serve as a backstop to minimize the impact of a gas cartel, should one be created.

End-use US gas demand is expected to climb to 23.9 tcf in 2015 and 26.9 tcf by 2025, up from 20 tcf in 2006. At the same time, domestic production is projected to be about 20.8 tcf in 2015 and 21.2 tcf in 2025.

If more federal lands are not opened up for drilling, the US will have to rely on imports for 20% of total gas consumption by 2025, increasing to 31.1% by 2030. Of these volumes, 20-25% would be from the Middle East. However, the report added, opening the locked-in lands would not lead to total gas independence. A strategic gas reserve might be more politically expedient as would conservation offsets or "trading" of conservation efforts to offset productive activities.

The table is the Energy Information Administration's short-term Natural Gas Outlook 2008 forecast made prior to government policy intervention. EIA said it will revise its forecast in light of the recently passed HR 6, the Energy Independence and Security Act of 2007 signed into law on Dec. 19, 2007.

Canada

Canadian energy markets are expected to function well, with energy prices

balancing energy supply and demand, said Roland George of Canada's National Energy Board. Ample supplies are available to meet the country's needs, and fossil fuels and other conventional fuels will continue to dominate.

Canada has 420 tcf of remaining gas resources, mostly in frontier provinces. George said conventional gas production from the Western Canada Sedimentary Basin (WCSB) will decline steeply, with mid-range prices not high enough to prevent it. Plans call for 25,000 gas wells to be drilled in WCSB.

Production will increase, however, in the northern and offshore areas and from unconventional gas sources. There will be an influx of LNG imports that will compensate for the reductions in WCSB production. He said seven import terminals are planned and that LNG will contribute to more than half of Canadian gas requirements by 2030.

The wide range of prices reflect uncertainty, he said, but: "We're looking at $5.50-12 (US)/million btu for gas."

Despite higher energy prices, demand is expected to increase with robust increases in population and the economy—expected to be about 1.8% over the medium-to-short term (10 years) and as coal is phased out in Ontario for electricity generation. Long term, he expects 0.3-1.4% growth as the economy slows. After 2015, with advanced technologies, clean coal is expected to meet more of the energy demand.

"Canada will continue to be part of an integrated continental energy market where the border goes each way," George said, emphasizing that Canada will continue to play a role in continental energy security. "Competition is a good thing" in North America, he said.

Several enablers will help to successfully overcome energy challenges: technology that offers solutions to expanding the boundaries of the conventional resource supply and improve energy efficiency; governmental policy that integrates across multiple objectives of economic growth, environmental sustainability, and development of the energy sector; adequate investments to develop new sources of energy and new and replacement infrastructure to meet the growth in energy demand; public engagement; and high quality analysis to facilitate timely decision-making.

Canada's Policy mandates a 20% reduction of greenhouse gasses by 2020, which will not take into account energy trading.

Mexico

Demand in Mexico for natural gas as an industrial feedstock and for electricity generation is soaring, reported the Baker Institute. "In 2006, Mexico imported 0.88 bcfd (or 16.2% of Mexican demand) from the US, which is up from only 5 MMcfd in 1986 and is three times higher than the volumes in 2000. Moreover, Mexican demand is expected to increase by 3.4%/year, leaving Mexico increasingly dependent on foreign imports unless it can reform its energy sector."

Mexico's last major energy reform opened downstream gas transport, storage, and distribution in 1995, said Francisco Salazar, president of Mexico's Energy Regulatory Commission (CRE). More than $1.5 billion has been spent since then on facilities, including 2,700 km of pipeline, to increase distribution to areas that had no access to gas.

Gas imports were necessary during 1995-2005, Salazar said, because demand exceeded domestic production. Consumption in 2006 was 6.5 bcfd, with 35% used for electric power generation and 14.6% for industrial use. Gas consumption in Mexico is expected to increase by 4.8%/year through 2015, rising to 305 Tw-hr in 2015 from 208.3 Tw-hr in 2007.

Most gas sales will be in the form of LNG. To facilitate its use, Mexico has published its first standards for LNG plants and granted five permits for import plant construction. Unfortunately two of the projects were cancelled for lack of a local permit (Marathon) and excessive cost escalations (Chevron Texaco).

Another two, in Baja California, merged into Sempra's Energia Costa Azul LNG, which is under construction and will have a send out capacity of 1 bcfd when it begins operations in late 2008. So there currently are only two planned LNG import terminals that have federal permits, Salazar said. The other, planned by Repsol, is on the east coast at Altamira with a 500 MMcfd capacity. Repsol has signed a long-term contract to import LNG from Peru, he said.

Salazar said Mexico is promoting private investment in LNG and will construct more pipelines to strengthen and expand the existing network and provide access to new LNG plants.

It also is pushing a "Permanent Regime" for open access, creating a National Integrated System (SNI) of open-access pipelines that will have a consistent price for usage, with a national injection charge and an extraction or user's fee.

In addition, Mexico is sponsoring coalbed methane research and supporting regulatory measures to promote more-effective use of its gas systems. Salazar said the government intends to allow prices to reflect market conditions. ✦

Alaska gas pipeline proposal progressing

Paula Dittrick
Senior Staff Writer

TransCanada's application to build a natural gas pipeline in Alaska is open for a 60-day public comment period, Alaska Gov. Sarah Palin said. It's the only one of five formal applications to meet all the state's requirements.

Other applications were submitted by Sinopec of China, AEergia of California, and two Alaska groups: the Alaska Gasline Port Authority and

the Alaska Natural Gas Development Authority.

Palin said the public comment period for TransCanada's proposal began Jan. 5. Following the allotted period for comment, she could submit the proposal to the state legislature, whose session begins Jan. 15.

"We're thrilled to have a project sponsor willing to build a pipeline on terms that benefit all Alaskans," Palin said.

TransCanada proposes a 48-in pipeline extending from Prudhoe Bay to Alberta, where it would tie into existing pipelines that transport gas to US markets. The project's estimated cost is $26-35 billion, and it's estimated that—if authorized by lawmakers—the proposed pipeline could start operation in 2017.

The proposed pipeline would follow the route of the existing trans-Alaska oil pipeline and the Alaska Highway, and continue through northern British Columbia to link with the pipeline grid in north-western Alberta.

State's role

In 2006, Alaska Gov. Frank Murkowski reached a privately negotiated pipeline agreement with North Slope producers ConocoPhillips, ExxonMobil Corp., and BP PLC. But that agreement was dropped when Palin was elected governor.

Upon taking office in 2007, she outlined elements of an open bidding process. The Alaska Gasline Inducement Act (AGIA) calls for the state to provide $500 million for a gas pipeline project and fixed tax rates for 10 years (OGJ, Mar. 12, 2007, Newsletter). Those incentives are for a pipeline project that meets state requirements.

AGIC replaced the Stranded Gas Development Act, a 1998 law that allowed companies to apply for state incentives for a large gas project.

Meanwhile, Palin said the state continues to review a pipeline proposal from ConocoPhillips that was made outside the AGIA solicitation.

ConocoPhillips has said a fiscal terms agreement on gas production would be needed in order for a gas pipeline project to proceed. Previously, ExxonMobil and BP made similar comments, but ExxonMobil and BP have not submitted any gas pipeline proposals to Palin.

A ConocoPhillips spokeswoman in Alaska said Jan. 7 that the company's proposal "has the best chance of leading to a successful Alaska gas pipeline project, and we look forward to working with the state." ✦

Alaska backs Kenai LNG export license extension

Paula Dittrick
Senior Staff Writer

Alaska Gov. Sarah Palin and other state officials said they support an application by Marathon Oil Co. and ConocoPhillips Alaska Natural Gas Corp. for a 2-year federal extension of an export license for their Kenai LNG plant at Nikiski, on Alaska's Kenai Peninsula.

The application for extension of the export license was filed with the US Department of Energy in January 2007. If granted, the extension would run through Mar. 31, 2011.

If the DOE does not extend the export license, the plant would close in March 2009. If the license is granted, both Marathon and ConocoPhillips vowed to drill more Cook Inlet gas wells.

The state of Alaska believes continued operation of the Kenai LNG plant is in "the best interest of the nation," Palin said during a Jan. 3 news conference

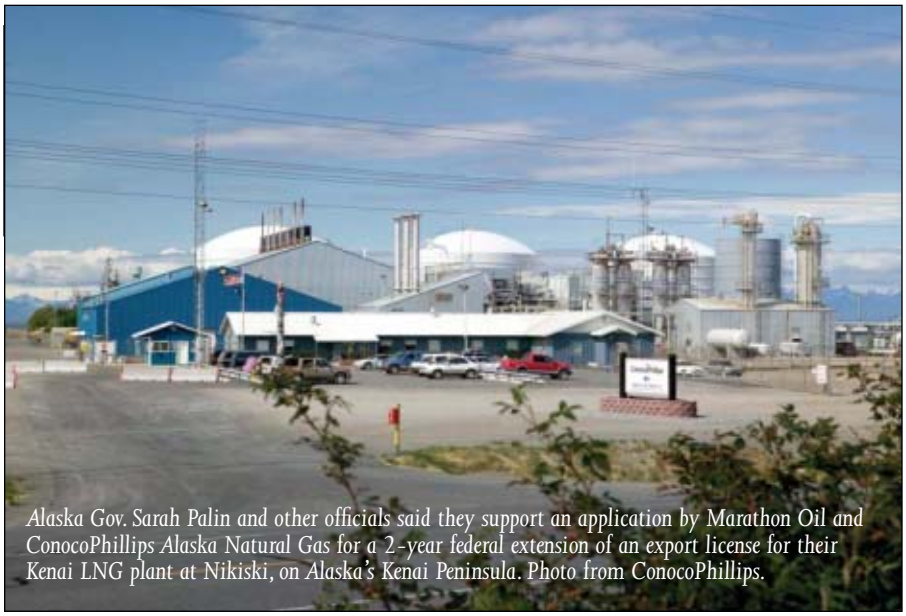
ConocoPhillips has a 70% share interest in the Kenai LNG project, which uses Phillips's Optimized Cascade process technology. Marathon owns the remaining 30%. The Kenai LNG plant started operations in 1969 and was the first complex to ship LNG volumes to Japan.

Palin said the plant provides a gas reliability role in the Cook Inlet region supply and demand balance. The plant has the ability to divert gas from export to Alaska markets for local heating and electricity generation during peak demand.

If certain south-central Alaska gas supply milestones are not met, the companies agreed to reduce exports below the LNG export quantities requested in the federal application. Kenai LNG is sold to Japan, although some gas previously has been diverted to Alaska.

The state agreement noted that the LNG plant has a positive impact on investment in regional gas development, provides employment in the Kenai Peninsula Borough, and provides royalty revenues and tax income to the state.

The agreement calls for ConocoPhillips and Marathon to continue negotiations with utilities Enstar Natural Gas Co. and Chugach Electric Association Inc. regarding gas supply agreements to satisfy Alaska gas supply needs. No price agreements have been reached.



Alaska Gov. Sarah Palin and other officials said they support an application by Marathon Oil and ConocoPhillips Alaska Natural Gas for a 2-year federal extension of an export license for their Kenai LNG plant at Nikiski, on Alaska's Kenai Peninsula. Photo from ConocoPhillips.

Drilling plans

If the federal export license is extended, ConocoPhillips agreed to approve 2008 drilling plans for at least two wells, and Marathon agreed to approve a minimum of five wells.

Jim Bowles, president of ConocoPhillips Alaska Inc., said his company plans to move a rig to Beluga field to drill two wells this year, and it also might drill two or three wells from Tyonek platform.

"Already, it's kicking off new plans and new thinking as far as gas development," Bowles said of the agreement with the state.

Marathon will drill 5-12 wells as a result of the agreement, said Steven Hinchman, the company's senior vice president of worldwide production.

ConocoPhillips and Marathon also agreed to make data available to other potential oil and gas explorers in the Cook Inlet region to encourage exploration and development.

The agreement includes a framework for cooperation among the Alaska, ConocoPhillips, and Marathon on future applications to the DOE for additional LNG export authorizations.

A goal is to make at least 30 MMscfd of plant inlet capacity available for gas purchased from other producers, the agreement said. ✦

Bush economic advice includes more domestic E&P

Nick Snow
Washington Editor

US President George W. Bush is including more domestic oil and gas exploration in his general economic recommendations as 2008 gets under way.

Bush reiterated his opposition to new taxes and voiced concern over impacts from the housing crisis. But he also noted that gasoline prices have risen and that consumers are feeling financially pinched.

"There is no quick fix. As a matter of fact, I signed good legislation, passed by Republicans and Democrats, that enables us to begin to diversify away from oil and gas, and that's good," he said on Jan. 7, referring to the 2007 energy bill he approved on Dec. 17.

"But the diversification isn't going to happen overnight. We ought to be exploring for more oil and gas in the United States of America, and I'm convinced we can do so in environmentally friendly ways," Bush told the Union League Club of Chicago.

At a Jan. 4 meeting of his working group on financial markets in Washington, the president said Congress and the administration will need to work together keep taxes low. Raising taxes when the economy is strong but indicators are mixed would be a serious mistake, he maintained.

"Secondly, we have got to understand that if we are worried about gasoline prices, we ought to expand refineries here in the United States, and we ought to explore for oil and gas in environmentally friendly ways in the United States," Bush continued. ✦

US House to lose major natural gas advocate

Nick Snow
Washington Editor

US Rep. John E. Peterson (R-Pa.), one of the House's strongest advocates for expanding natural gas production from the Outer Continental Shelf, announced on Jan. 3 that he won't run for reelection in 2008.

Peterson, who plans to serve out his term, said that "a few chronic, non-threatening health issues have to be addressed at home, requiring me to devote more time to my family, time and presence which would not be possible if I sought reelection."

While his initial impact after being elected to his first House term in 1996 was in securing services for rural Americans, Peterson defied conventional wisdom in early 2005 when he gave a floor speech urging an end to federal

OCS leasing bans that had been in place for more than a decade.

He and Rep. Neil Abercrombie (D-Hi.) cosponsored bills in 2006 and 2007 to lift the moratoria, dedicate fixed portions of resulting federal royalties to environmental restoration projects and renewable energy research, and share part of those royalties with producing states feeling the impacts.

Minority Whip Roy Blunt (R-Mo.) noted that when he and Peterson arrived to begin their first terms in January 1997, crude oil cost $23/bbl, gasoline cost $1.25/gal and natural gas cost about $2/Mcf.

"More than a decade later, with oil in triple-digits and American manufacturers being forced overseas by spiraling natural gas costs, John's message of responsible energy development may be more relevant and important today than ever before," Blunt continued.

Before his election to the US House, Peterson was a Pennsylvania state senator during 1985-96, a member of the state's house in 1977-84, and a Pleasantville Borough Council member for the decade 1969-76. ✦

WATCHING GOVERNMENT

Nick Snow, Washington Editor

New BLM fee: a precedent?

The US Bureau of Land Management announced Jan. 2 that it will collect a $4,000 processing fee for each new oil and gas drilling permit application. Rocky Mountain producers warn of a dangerous precedent.

December's omnibus spending bill made the fee part of the Department of the Interior's fiscal 2008 budget. "The House was insisting on it. The Senate was against it. What made the difference was that the White House came out in favor of it," said Bob Gallagher, director of the New Mexico Oil & Gas Association in Santa Fe.

He asked BLM's public affairs office how language in the 2005 Energy Policy Act prohibiting BLM from recovering such costs affect the fee. Spokesman Tom Gorey responded that the omnibus spending bill specifies it is a processing, not a cost-recovery, fee.

"The money generated by these fees is not new revenue but rather a reimbursement to the US Treasury for the estimated cost of processing new APDs [applications for permits to drill] for the duration of fiscal year 2008," BLM said in a press release.

Bigger question

"They used the word 'reimbursement' in their press release, but it looks a lot like recovery," Gallagher told me. "We don't believe their language legally gets them over the provision. The bigger question is where it will stop. If you have cost recovery for APDs, do you also allow it for rights-of-way or other procedures?"

Tim Spisak, who heads BLM's fluid minerals division, said Congress reduced the agency's oil and gas operations budget by $25.5 million and created a new APD appropriation for that amount. "It put in a mechanism to collect a processing fee and tied it to a reimbursement for the appropriation. BLM gets the same funding level; it's just broken up into two different funds," he explained.

But Marc W. Smith, executive director of the Independent Petroleum Association of Mountain States in Denver, said the fee increases the cost of processing a document without improving the level of service.

'A new tax'

"It's a new tax on domestic energy production. More important, it doesn't address any of the ongoing needs of the BLM offices that are trying to keep up processing drilling applications and managing other public lands needs," he maintained.

"Right now, there's no promise it actually will go to BLM. The money is earmarked for the general treasury," Gallagher added. He conceded that the additional cost by itself should not affect overall activity. "If $4,000 is going to queer the deal, you shouldn't drill the well," he said.

But he and Smith agreed that such a fee never was part of the original contracts to develop federal energy resources. "It's a little like a landlord, when you rent an apartment, telling you there's a processing fee every time you submit your rental payment or pick up your mail," Smith said. ✦

BMI: Venezuela still vital Latin American oil supplier

Eric Watkins
Senior Correspondent

Venezuela will account for just 8.04% of Latin American oil demand by 2011 while providing about 28.24% of its oil supply by then, according to a recent analyst report.

Business Monitor International's Venezuela Oil & Gas Report claims that Latin America regional oil demand rose to 7.15 million b/d in 2006. It said the region should average 7.33 million b/d in 2007 and then rise to 8.15 million b/d by 2011. Regional oil production was 10.58 million b/d in 2006. It is set to rise to 11.51 million b/d by 2011.

The region consumed 179 billion cu m (bcm) of natural gas in 2006, with demand of 268 bcm targeted for 2011, representing 50% growth. Production of 175 bcm in 2006 should reach 274 bcm in 2011 and implies just 6 bcm of net exports at the end of the period.

Venezuela contributed about 16.04% to 2006 regional gas consumption, while producing 16.35%. By 2011, it is expected to consume 17.92% of the region's gas, while contributing 17.50% to supply.

BMI assumes oil and gas liquids production of no more than 3.25 million b/d by 2011, with the country expected to produce 2.65 million b/d in 2007. Consumption is forecast to increase by around 3%/year to 2011, implying demand of 655,000 b/d.

The report said Venezuela's export capability would be about 2.6 million b/d by 2011, while gas production is forecast to rise to 48 bcm over the period from 28.7 bcm in 2006 matched by equivalent consumption.

Crude oil export revenues are estimated at $48.30 billion for 2007, assuming an OPEC basket price of $64/bbl. Based on BMI's assumption of $61/bbl crude in 2008, $55/bbl in 2009, and an average $50/bbl in 2010-11, crude oil export revenues will be $44.96-47.35 billion during the period. Gas export potential exists beyond 2011.

In the BMI business environment rankings matrix, Venezuela received a composite score of 30, ranking it sixth out of nine states included in the region.

"The overall business environment can be considered no better than neutral in a regional context, in spite of the country's perceived high level of long-term economic risk, plus the demanding licensing and production-sharing regime," it said.

While recent changes in taxation and its licensing system have reduced foreign involvement in Venezuela, several key players appear committed to the country while others are reassessing their involvement.

Meanwhile, BMI said the country has "considerable untapped hydrocarbons potential, with a high reserves-to-production ratio, significant output growth potential, and an established competitive framework."

Drawing attention to some of that potential, BMI cited statements of state oil firm Petroleos de Venezuela SA (PDVSA), which claimed in June 2007 that a study conducted by US engineering firm Ryder Scott has determined that Carabobo Block 3 in Venezuela's Orinoco belt holds 28.65 billion bbl of oil.

The firm said the block may hold proved reserves of 5.7 billion bbl, based on the expectation that 20% of the oil deposits can be recovered.

Venezuela is trying to verify the vast reserves of the Orinoco extra-heavy crude belt, as the government is negotiating majority stakes in the Orinoco projects, which were forcefully nationalized by President Hugo Chavez.

BMI also noted that Venezuela may be inflating its reserves claims. "In spite of recent underinvestment and reduced international oil company involvement, Venezuela claims that its proven oil reserves have risen to 100 billion bbl. This is well in excess of most external estimates."

The country's energy and oil ministry said it has certified 12.4 billion additional bbl of proved reserves in the country's Faja del Orinoco region, where the government assumed control of oil ventures with IOCs earlier in 2007.

In Carabobo Blocks 2, 3, and 4, in the Orinoco region, surveyors have certified 20.1 billion bbl of proved crude oil reserves and more than 140 bcm of gas reserves, BMI said, citing a government statement.

In the Orinoco Magna Reserve project, meanwhile, the Chavez government expects to certify more than 200 billion bbl of crude oil reserves, which—if correct—would give Venezuela the largest hydrocarbons reserves in the world. ✦

South Korea to ban single-hull tankers by 2011

Eric Watkins
Senior Correspondent

The South Korean government will ban the entry of single-hulled tankers into its waters starting in 2011, about 5 years earlier than originally planned, as the Asian nation continues to suffer from the effects of its worst-ever oil spill on Dec. 7, 2007.

"We can implement the ban sooner than planned following the oil spill," said an official of South Korea's Ministry of Maritime Affairs and Fisheries, referring to the collision between the very large crude carrier Hebei Spirit and a barge off the country's west coast.

Massive clean-up efforts are still under way and the South Korean government has yet to release a damage estimate or how much the clean-up will cost.

The South Koreans had originally planned to prevent single-hulled vessels, considered more spill-prone that double-hulled ships, from entering their waters in 2015—a start date lobbied for by the nation's oil industry and ministry of commerce.

Modern tankers are fitted with two hulls to reduce the risk of an oil spill, and are usually more expensive to hire.

Hebei Spirit spill

The Hebei Spirit was fitted with one hull, according to Lloyd's Register-Fairplay, which assigns ship-registration numbers. An international ban on such ships is due to start in 2010, with South Korea one of 146 nations that pledged to uphold the ban.

But last month's disaster has prompted the change of policy in Seoul as the collision between the barge and the Hong Kong-registered supertanker caused 10,500 tonnes of oil to spill into the waters off the South Korean coast.

The spill is the worst in South Korea's history and is the biggest anywhere since the Tasman Spirit leaked about 27,000 tonnes of oil at the port of Karachi in Pakistan in July 2003, according to Tim Wadsworth, technical support manager for the International Tanker Owners Pollution Federation Ltd.

The Hebei Spirit leak was estimated at almost a third of the 37,000 tons spilled into Alaska's Prince William Sound by the Exxon Valdez in 1989, according to ITOPF.

At the time of the Hebei disaster, reports said South Korea was struggling to contain the spillage, which occurred near Hyundai Oilbank Co.'s refinery on the nation's west coast.

The South Korean government dispatched 30 patrol boats, 4 helicopters, and 10 oil-spill control vessels to the site where the collision punched three holes on the ship's side and spilled the oil, according to the Ministry of Maritime Affairs and Fisheries.

Although the Hebei Spirit had stopped leaking by then, the slick from the spill was estimated at 7.4 km long and 2 km wide.

WATCHING THE WORLD

Eric Watkins, Senior Correspondent

Iran provokes US, Turkey

Should the oil and gas industry worry about an ankle-biter? That's what Iran seems like these days after the administration of US President George W. Bush reversed its view of the Iranians' nuclear pretentions.

Yet, just last week, Bush said Iran had committed "a provocative act" in the Strait of Hormuz when Iranian speedboats approached three US navy ships and threatened that the ships would explode.

"It's a dangerous situation and they should not have done it, pure and simple," Bush said. "I don't know what their thinking was but I'm telling you what I think it was." He said, "It was a provocative act."

The Strait of Hormuz, the most prominent choke point in the global crude oil trade, handles 17 million b/d of the world's water-borne crude oil, more than a third of total shipments.

Iran is well aware of the effect that adverse moves in the region have on oil markets, but it dismissed US concerns about the incident, calling it routine for both sides.

'Ordinary and natural'

"The example that happened on Saturday was similar to previous cases and is an ordinary and natural issue," said Iranian Foreign Ministry spokesman Mohammad Ali Hosseini.

"This is an ordinary issue that happens for the two sides every once in a while and, after the identification of the two sides, the issue is resolved," he said.

For a while, at least, it may indeed have been resolved since the Iranians apparently have other fish to fry.

Iran has suspended supplies of natural gas to Turkey due to a cold weather front that brought a sharp fall in temperatures, rain and snow in the region, according to Turkish television reports.

Under a contract signed in 1996, Iran must ensure daily supplies of 28 million cu m of natural gas to Turkey via a 2,500-km pipeline connecting the two countries.

"Despite its pledge to ensure uninterrupted supply of natural gas during the winter, Iran failed to meet its obligations in the past 10 days and fully stopped energy supplies," said Turkey's Minister of Energy and Natural Resources Hilmi Guler.

Shivering in Turkey

Iran has in the past halted natural gas deliveries to Turkey several times during the winter citing increased domestic demand for the fuel.

Turkey has never built domestic fuel storage facilities and always compensated for the shortage of exports from Iran with additional supplies from Russia and other countries.

NTV television said Guler would ask Prime Minister Recep Tayyip Erdogan to negotiate the issue of natural gas supplies with Russian and Iranian presidents.

"I have discussed the current situation (with gas supplies) with my Iranian counterpart, but now I will have to ask the head of the (Turkish) Cabinet to conduct direct negotiations with presidents of Russia and Iran," Guler said.

Turning off the gas, now that's a really provocative act. To the Iranians, though, it apparently is just another routine matter. ✦

Per Mansson, a tanker broker at Nor Ocean Stockholm AB, said South Korean oil companies are probably the world's biggest users of single-hull tankers, but that the collision might cause a change of policy in South Korea that would have a tremendous effect on the market.

South Korea, along with India, dominates the fixture lists of single-hull tankers, which no longer trade to Europe and North American ports.

Some 60% of crude imported to South Korea is shipped on single-hull tankers, about two to three times the market average, according to a report by Citigroup Global Markets. The report said 173 single-hull tankers were fixed until mid-December to South Korea, from the 628 single-hull VLCC fixtures in 2007.

Within days of the spill, the demand for double-hulled VLCCs rose. In its weekly report on tanker shipping rates, EA Gibson said the collision and oil spill "could be a trigger for a major shift in the tanker industry."

Analysts also said that smaller number of available large tankers, and higher daily rates to charter them, could prompt many charters to split their cargoes on to smaller ships such as Aframaxes, leading to increased rates for these vessels as well.

Meanwhile, Hyundai Oilbank, the company that received the oil from the single-hull Hebei Spirit, has already indicated it plans to change its own chartering practices.

In a statement, Hyundai Oilbank, while awaiting government directives on single-hulled ships, said it would revise its chartering policy following the Hebei Spirit spill by increasing the number of double-hulled VLCC chartering. ✦

Eurogas concerned about EC's third energy directive

Doris Leblond
OGJ Correspondent

The wider powers to be granted regulatory authorities under terms of the European Commission's proposed "Third Energy Package" directive, which was announced Sept. 19, 2007, are causing Eurogas concern. In a 7-page note published Jan. 3, the 30-member gas trade group said the powers lack "a clear accompanying framework" and that the introduction of "powers for the commission to adopt guidelines on a wide range of subjects," leaves only "negative powers" to the EU council and parliament.

"This means that the democratic procedure is exercised differently from the codecision procedure for approving legislation," Eurogas charged.

As a major representative of Europe's gas market players, Eurogas wants a stronger role and greater involvement in applying the right legislation. It outlined its position on proposed regulatory powers and the respective roles of the national regulators: the Agency for the Cooperation of Energy Regulators (ACER), the EC, and the European Network of Transmission System Operators for Gas (ENTSOG).

The new regulatory powers proposed for the EC in the third energy package, Eurogas said, "marks a shift in the traditional pattern of segmentation between the regulated infrastructure business and the competitive, nonregulated supply business," with regulatory authorities being granted wider powers "in the interest of ensuring a well-functioning and competitive market."

However, to ensure that the process is transparent and nondiscriminatory, it is essential, insists Eurogas, to establish a "clear policy framework within which the national regulatory authority can implement the additional powers to promote effective competition and ensure the proper functioning of the market." Better regulation depends on the quality of regulation, which inevitably implies "the participation of the companies involved in the market," Eurogas insisted.

This framework should, therefore, include consultation with market participants and publication of clear and fully reasoned decisions that take into account the views of market participants, the existing contractual obligations of the parties concerned, and the expected costs and benefits of the decision.

It should also include a memorandum of understanding at the national level setting out the cooperation process between the national regulatory authority and the national competition authority, based on the principle that competition law compliance is mainly the responsibility of the competition authority, while the regulatory authority plays an assisting role.

On the EC's new powers to adopt guidelines on a wide range of subjects, Eurogas fears that in key areas, binding rules may be adopted "after the legislative process has come to an end" with "inherent limitations of the democratic legitimacy."

To counter that risk, Eurogas wants market players to take part in drawing up a list defining priorities of subjects where such guidelines may be adopted by the EC, a list drawn up in cooperation with the proposed ACER.

But while Eurogas approves the creation of ACER as a step in the "right direction" to reach policy objectives for the development of regional markets, promotion of market integration, and suppression of trade restrictions among member states, it notes that the degree of its independence from the Commission and national energy regulators "is unclear." ACER should, for instance, be given more powers to stimulate regional market integration to complement the third energy package's "more general focus on national markets."

Likewise, Eurogas doubts whether

ENTSOG is best placed to be empowered by the package to establish and adopt technical and market codes. The organization insists that market players should be more involved in this procedure through a "formally defined role" to comment on and participate in the development of any proposed codes. ✦

Yadavaran buyback contract signals better Iranian terms

Paula Dittrick
Senior Staff Writer

A recent Chinese buyback contract for development of Iran's Yadavaran oil field indicates possibly better terms for international oil companies, said a senior consultant with FACTS Global Energy.

"This deal is considered as one of the most important deals with a foreign oil company in Iranian petroleum industry since the last 3 years," said Alexis Aik of FACTS Singapore office.

But she noted that lack of confidence in Iran's political environment and concerns about its economy remain a deterrent to international oil investors.

In October 2004, Iran signed a memorandum of understanding with China Petroleum & Chemical Corp. (Sinopec) to develop Yadavaran field (OGJ, Apr. 23, 2007, p. 20; OGJ Online, Nov. 27, 2006).

Under that deal, China agreed to buy 10 million tonnes/year of LNG from Iran for 25 years.

After 3 years of negotiations, Iran and Sinopec on Dec. 9 signed a buyback contract outlining Yadavaran development in two phases. Production is expected in 2009 (OGJ Online, Dec. 18, 2007).

Other stakeholders in the field are Iran's National Iranian Oil Co. and Indian firm ONGC Videsh Ltd.

Contract terms

Currently, the buyback contracts are the only available option for foreign investments in Iranian upstream projects.

In the buyback contract, the contractor funds all project investments with pay back of the capital cost to be deducted from sales revenue of oil and gas for 7-8 years.

Iranian buyback contracts might not seem attractive to some companies because the rate of return (ROR) appears to be low compared with other international projects.

This is compounded by the fact that previously negotiated buyback contracts had little or no flexibility regarding cost escalations.

"Currently, a combination of unattractive commercial terms for buyback contracts, political problems created by the Iranian government, and the general lack of confidence in the stability and sustainability of the Iranian economy have kept many serious foreign players away from petroleum projects within the country," Aik said.

Flexible contract

But the recent buyback contract with Sinopec sent a different signal to foreign oil companies:

- The 4-year payback period is about half that of earlier buyback contracts.
- The ROR was set at 14.98% with no risk, representing a premium of 3% compared with older contracts. One example is NorskHydro's buyback contract for the KhoramAbad block.
- For the fist time in Iranian buyback contract history, the Sinopec provided flexibility in terms of probable cost escalation, reducing risk.

"All these point towards more attractive terms for Iranian buyback contracts that may be applicable for future buyback contracts," Aik said.

Politics behind deal

With the exception of China and Russia, the United Nations Security Council and Germany wants more political and commercial sanctions on Iran.

Among the five permanent members of the council with the power to veto, China and Russia disagreed with a third UN resolution to extend sanctions.

China unexpectedly agreed with the US on Dec. 3, 2007, on the basis for more UN sanctions on Iran's nuclear program. The US announced the UN Security Council, with the Chinese government, will be able to focus on a number of areas where sanctions are to be implemented.

A week later, Sinopec signed a buyback contract with Iran.

"It seems the deal was in response to the agreement that China had with the US for more Iranian sanctions. This was probably to garner more support from the Chinese government," Aik said. ✦

Gorgon JV expands Barrow Island LNG capacity

Rick Wilkinson
OGJ Correspondent

The Gorgon joint venture—Chevron Corp., ExxonMobil Corp., and Royal Dutch Shell PLC—has decided on a 50% increase in the scope of the proposed LNG project facilities on Barrow Island off Western Australia from two 5-million-tonne/year trains to three trains of 5 million tonnes/year capacity.

A Chevron Australia spokesman says that developing three LNG trains in rapid succession will improve the project economics and address mounting industry cost pressures.

However the addition of a third train will need an additional approval from the government and the environmental authorities.

Chevron says that it expects very little change to the environmental impact on Barrow, as the three trains will all be built within the already approved 300 hectare development site which represents 1.3% of the island's total area.

A formal environmental assessment for the third train is to be referred to the Western Australian Environment Protection Authority in the next few months.

The expansion had been mentioned unofficially several times last year and the recent official decision has been driven by the rising cost pressures facing all projects in the north of Western Australia. However it is likely to attract renewed scrutiny and debate.

The Gorgon Project has an estimated resource base exceeding 40 tcf of gas in fields located 200 km offshore in up to 1,300 m of water.

Chevron says that during the next 12 months it will be working with government to secure approvals for the third train and will commence the front-end engineering and design. It also will be considering an expansion of the project team and the possibility of early initial work on Barrow.

There is no word yet about whether the JV will need to increase the number of subsea wells, the carrying capacity of the two pipelines in the initial design, or to build a third pipeline or tap additional fields in the Gorgon area.

In related news, Chevron has placed an order with Atwood Oceanics Inc. for a new $590 million semisubmersible rig to work exclusively in the company's offshore northwest Australia permits for 3 years with an option for 6 years.

The rig, to be built in the Jurong shipyard in Singapore, is expected to be delivered in early 2011.

It will be able to conventionally moor with its own equipment in water as deep as 6,000 ft and to moor at 8,000 ft with prelaid moorings.

Since 2005 Chevron has been awarded seven new deepwater permits off Western Australia and has made three significant gas discoveries: Wheatstone, Chandon, and Clio. ✦

Gazprom prompts fears, seeking Nigerian gas development

Uchenna Izundu
International Editor

Russia's OAO Gazprom is in talks with Nigerian energy officials to develop the country's vast gas reserves under a possible $2.5 billion deal, prompting fears in Europe and the West about the company's domination of gas supplies.

Gazprom said it was interested in developing a relationship with Nigeria, which it regards as a key place in sub-Sahara Africa. A company spokeswoman told OGJ that "Africa is one of Gazprom's priorities, as the company made a decision to go global in terms of acquiring assets and developing strategy outside Russia." It is looking at exploration, gathering, processing, technology transfer, and infrastructure development.

"Africa is one of Gazprom's priorities, as the company made a decision to go global in terms of acquiring assets and developing strategy outside Russia."

Nigeria is developing a number of gas export projects and has called for foreign investment, including power generation plants, liquefaction proposals, and the Trans Sahara gas pipeline, which would transport gas through Algeria to Europe. It has been particularly keen to attract non-Western support, looking to India and China to sign deals. Nigeria has committed to eliminating gas flaring by 2008, and this could present another investment opportunity for Gazprom.

Under Nigerian President Umaru Yar'Adua's energy agenda, domestic gas development is taking precedence so Nigeria can realize its economic potential and improve living standards for its citizens (OGJ Online, Dec. 12, 2007). The country will ramp up domestic power production. Gas-fired electric power generation will be expanded to nearly 15 Gw by 2012 from none in 2007. Gas use for power will expand to more than 6 bcfd by 2011.

International development programs are of increasing importance to Gazprom as domestic production stagnates. Analysts Global Insight said any deal would ensure that "Gazprom will also control some Nigerian gas that could potentially compete with Russian gas for a share of the European market. Gazprom could divert some of its Nigerian gas production to the domestic market, reducing the overall gas volumes available for export from Nigeria." Gazprom's investment would position it as a direct competitor with Western supermajors for access to energy reserves in West Africa, it added, signalling a determination to wage influence in the region.

"Gazprom will also control some Nigerian gas that could potentially compete with Russian gas for a share of the European market."

Nigerian oil industry officials have so far described the talks as "productive", but no agreements have been signed. ✦

New exploration concepts highlight Columbia River basin's potential

Scott L. Montgomery
Petroleum Consultant
Seattle

Rising demand for natural gas in the US and an uncertain outlook for imports make the search for new domestic reserves both urgent and economically attractive. Few regions of the world are as extensively explored as the lower 48 states, yet there remain a small number of frontier areas of the first rank with proven hydrocarbon potential.

Among these, the most underexplored by far is the Columbia River basin (CRB) of south-central Washington State (Fig. 1). This 60,000 sq mile province, larger than most Rocky Mountain basins, is also unique in geologic character, complexity, and gas prospectivity.

It was the target of important, if intermittent, industry interest from the 1950s to the 1980s, when several companies led by Standard of California and Shell drilled a remarkably courageous series of deep wildcats attempting to penetrate thousands of feet of basalt in hopes of encountering thick Eocene reservoirs beneath.

Now, a new round of activity is under way. The first phase of this activity involved three deep tests, drilled between 2005 and 2007 by EnCana Corp., providing important confirmation of basin potential and adding significantly to understanding of the CRB. The next phase of work, currently in progress, involves an impressive technical effort spearheaded by Exxel Energy Corp. of Houston. Results of these efforts not only justify further drilling but reconsideration of two older wells as possible reentry candidates.

The present article is intended to summarize some of the ideas and information that contribute to this conclusion. As such, it is aimed at updating previous publications on the hydrocarbon potential of the basin,[1,2] including the author's own.[3] The writing of this report has benefited greatly from selected access to data provided by Exxel Energy, a major participant in the CRB play.

Exploration history

The current round of drilling represents only the second time modern exploration methods have been applied to the CRB.

During the 1980s, Shell, Meridian, Arco, Chevron, Exxon, and several independent operators were involved in detailed study of the province. Their analyses, based on surface mapping in surrounding areas, as well as data from a few older wells plus seismic, gravity, and magnetotelluric (MT) surveys within the CRB proper, yielded a preliminary basin model.

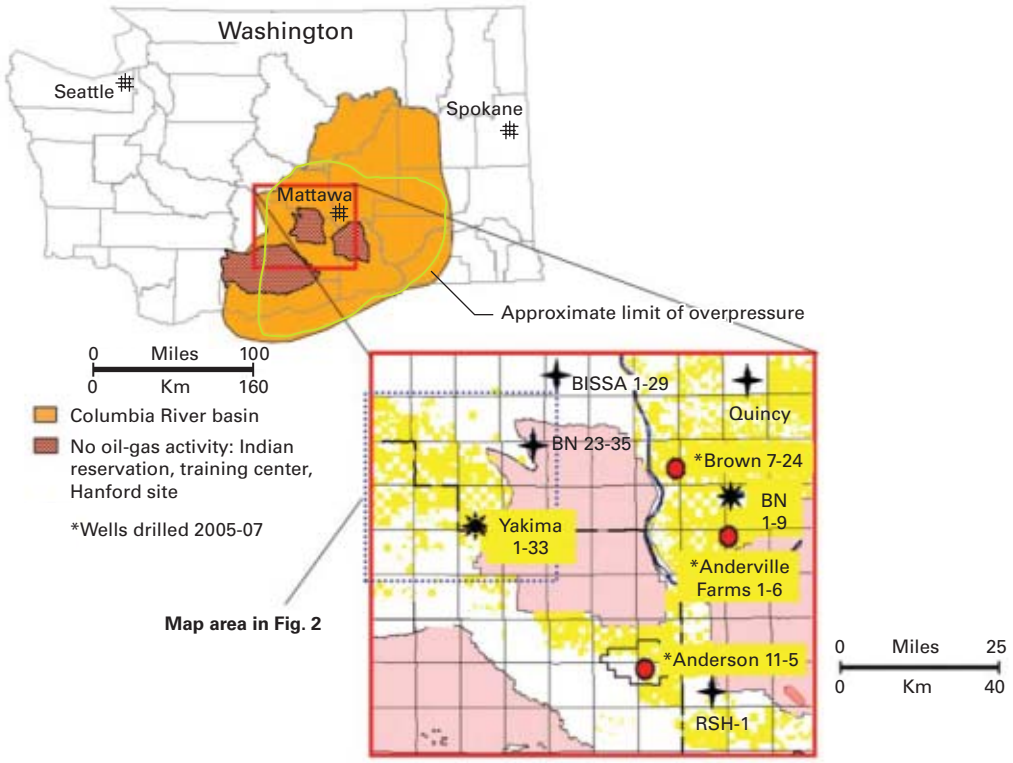
Several key aspects of this model are worth reviewing. Shell et al. verified the existence of three graben-like subbasins filled by Eocene fluvial deposits (Swauk/Manastash/Herren and Roslyn/Naches/Chumstick formations) and Oligocene volcanogenic and siliciclastic rocks (Ohanepechosh and Wenatchee formations, respectively), overlain by Miocene flood basalts. Thickness of the basalt was difficult to predict at the time, but data strongly suggested it increased substantially into the subbasin lows.

Major structures included basement horsts and long, narrow, late-stage folds (Yakima fold belt) bounded by shallow thrust faults that appeared to steepen with depth. Based on field study, reservoir quality was expected to be highest in the Swauk and possibly the Roslyn intervals. Surface structures were interpreted to continue at depth. The model did not incorporate the possibility of a basin-centered gas accumulation, as this concept was not yet articulated.

Shell and partners drilled eight wells, mainly to test Yakima fold belt structures. Five of these penetrated into the prospective Tertiary reservoir section.

SIGNIFICANT DEEP TESTS AND INTERPRETED EXTENT OF OVERPRESSURE

Fig. 1



Two wells, the Shell Western Yakima Minerals 1-33 and BN 1-9 (Fig. 1), tested significant flows of gas. The BN 1-9, in particular, produced up to 5.1 MMcfd and 6 b/d of condensate over a 62-day period. Both wells indicated many zones in the Eocene-Oligocene section with significant sand development and gas potential, based on mud and well log information. Both were deemed noncommercial and abandoned due to a combination of low gas prices, high drilling costs, and lack of gas transport options.

The three recent tests (Fig. 1), drilled by EnCana in varying partnership with Shell, Delta Petroleum, Exxel, and Netco, apparently targeted Roslyn on basement uplift and thrust-related structures as well and were guided in part by exploration concepts developed by Savant Resources LLC.

The Brown 7-24 apparently intended to test a large basement feature, while the Anderson 11-5 and Anderville Farms 1-6 seem to have had objectives in deeper, fault-related traps below 12,000 ft. Detailed results of these wells remain proprietary, yet several comments may be made on the basis of information recently released by Delta Petroleum:[4]

1. The Brown well encountered its target but penetrated a considerably thinned Roslyn and Swauk section before bottoming in basement;
2. The Anderson penetrated a significantly thickened basalt cover and did not reach its intended target; and
3. The Anderville test may have been in an off-structure position.

These results highlight three facts.

First, like most of Shell's program in the '80s, none of these wells succeeded in completely evaluating the concepts on which they were based. Downdip potential on the Brown feature, for example, may be the reason that Exxel assumed control of this well.

Second, exploration in the CRB remains at an early but critical stage. Explorationists face significant challenges related to predicting the depth, extent, and structure of the subbasalt section.

Third, geoscientific analysis of a high order, combining all forms of available data, is required to resolve the petroleum system operating in the basin.

At present, large parts of the CRB are under lease. Major players involved in the basin remain Shell, EnCana, Exxel, Delta, Trident Energy, Savant Resources, and Netco. Delta has permitted two wells for future drilling, the Gray 31-23 and McBride 28-13, both located in a portion of the CRB, south of the Pasco subbasin, without any previous deep tests and distant from outcrop exposures.

According to Delta,[4] the Gray well targets an anomaly defined in part on the basis of magnetotelluric data. This anomaly is interpreted to thin the basalt cover by 50% and create about 5,000 ft of local structural relief. Exxel Energy, meanwhile, has identified a series of prospects in the northern CRB, located over basement highs and thrust closures.

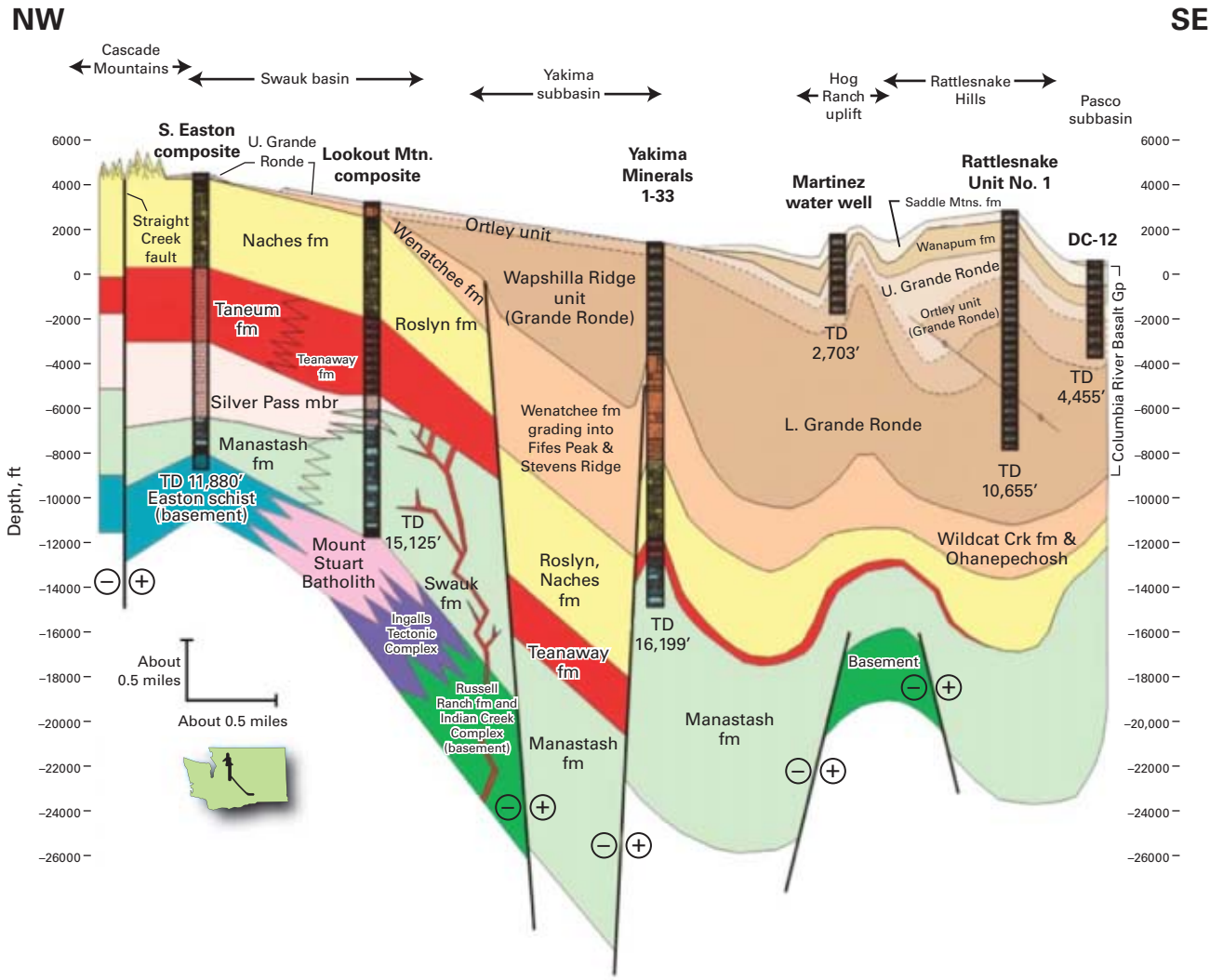
Exploration concepts

A large team of geoscientists assembled by Exxel Energy has developed an updated and evolving basin model for the CRB.

This model has benefited from innovative methods that integrate gravity, magnetic, and seismic data (reflection and refraction) and that incorporate exhaustive geologic and geochemical

TOP ROSLYN CONTOURS NEAR YAKIMA MINERALS 1-33 WELL

Fig. 2



Source: Map data courtesy of Exxel Energy.

studies based on outcrops around basin margins and hundreds of wells drilled in both eastern and western Washington (many wells in western Washington penetrate the identical Tertiary stratigraphic sequence as exists in the CRB).

The result, compared with interpretations based on only one or two data types (e.g., MT and well correlations) is a greatly enhanced ability to image and characterize the subbasalt section. Improved delineation is now possible of such key parameters as basalt thickness, subbasin geometry, structural style, burial history, and reservoir distribution.

Exploration concepts that emerge from Exxel's recent work firm up earlier interpretations and also reveal some surprises. A selection of related concepts would include the following:

Reservoirs

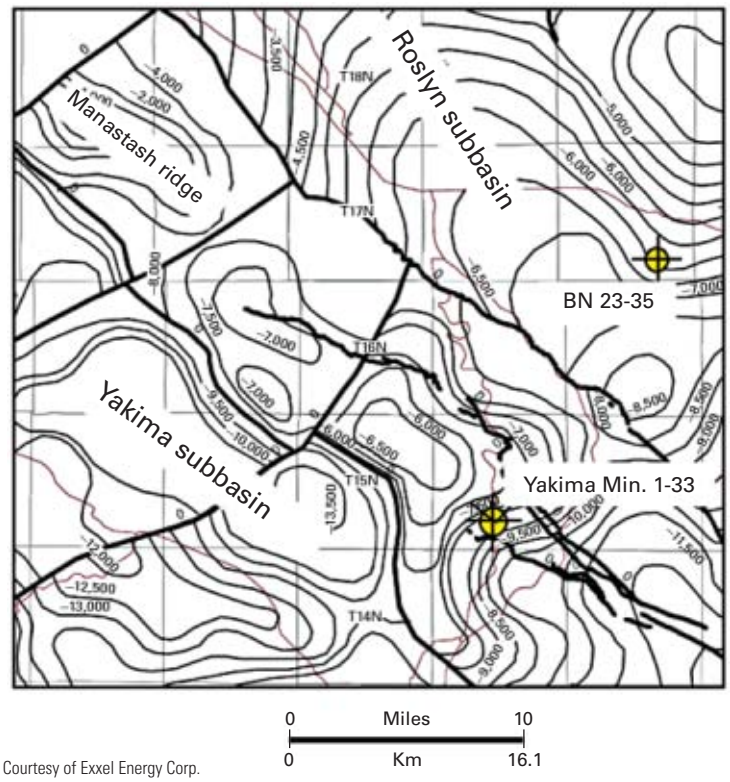
The primary target reservoirs are the Eocene Roslyn formation and equivalent rocks. Secondary objectives include the underlying Swauk/Manastash and Teanaway formations, as well as the overlying Oligocene Wenatchee (Fig. 2). The Roslyn represents deposition by low-gradient meandering streams that traversed peat swamps. Sandstones of both distant and local provenance often contain coaly material and are interbedded with carbonaceous shales and coal beds, thus creating reservoir/source rock "couplets."

In the deeper parts of the Yakima and Pasco subbasins, sandstones have little remaining pore space due to extensive diagenesis (quartz overgrowths, authigenic clays, and zeolites). Gas-bearing sands closer to basin flanks and on structure retain porosities of 10% or more. Migration of gas into these sands is interpreted to have inhibited the later stages of diagenesis, preserving porosity.

Wenatchee sands are mixed fluvial and volcanogenic deposits that have also been subjected to significant alteration. In the BN 1-9 well, however, gas

REGIONAL STRATIGRAPHY WITH MAJOR INTERVALS IN KEY WELLS

Fig. 3



Source: Courtesy of Exxel Energy Corp.

is present in thin (5-20 ft) sands below 12,500 ft depth, again suggesting that migration was an important inhibiting factor on diagenetic processes.

The Teanaway is a nonmarine, volcaniclastic unit at the base of the Roslyn that appears to have tested gas and very high volumes of water in the Yakima 1-33 well over a thick perforated interval. In the central and southern portions of the CRB, net sandstone in the Roslyn alone averages 2,100 ft, testifying to a very large gas resource.

Structural style

Three types of dominant structures exist: horst-like basement uplifts; a system of NW-SE dextral, oblique-slip faults; and a set of east-west folds commonly bounded by low-displacement thrusts. A number of basement uplifts and also the boundaries of subbasin lows are defined by the NW-SE fault system and its weaker NE-SW conjugate set (Fig. 3).

Thrusted folds in the basalt have a complex, variable relationship to structures at depth. In some areas, thrusts are detached, while in others they may be rooted in older, basement faults. In general, it is now speculated that much of the basalt cover responded as a separate structural entity relative to the underlying sedimentary section. New analysis of seismic and other data suggests that ramp-type geometries are prevalent in certain parts of the basin (Fig. 4).

These interpretations, which revise previous ideas of basin structure, highlight new kinds of prospects, including those where conventional traps and the basin-centered accumulation may be superimposed. Despite the existence of brecciated basalt at the surface, faults are interpreted to be sealing at depth within the Tertiary section, based on analogy (e.g., to Oregon's Mist field). Base of basalt is reliably predicted from a combination of integrated geochemical stratigraphy, gravity and magnetic data, well correlations, and mapping of individual flow geometries within the basalt section.

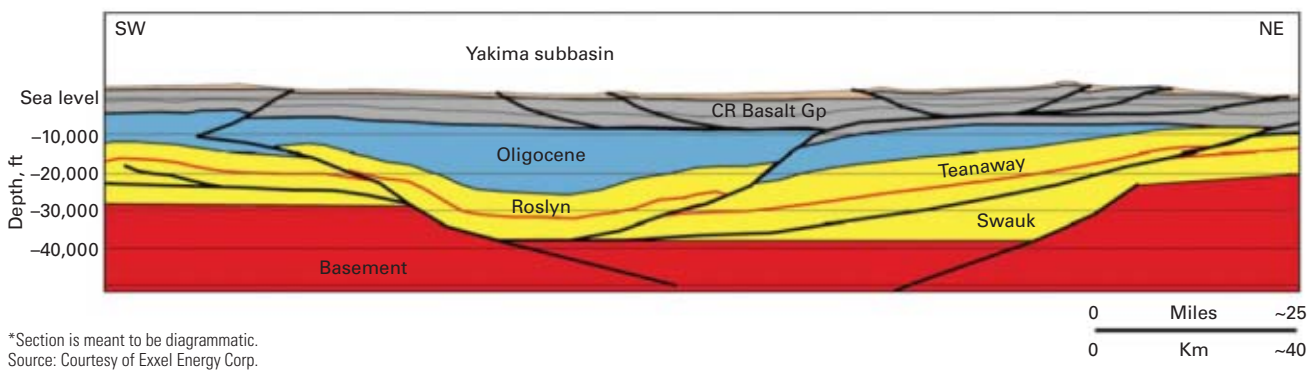
Trap types

As suggested by Fig. 5, there are a minimum of five trap types in the CRB. These include:

1. Basement highs.
2. Thrust-related closures.
3. Subthrust (upturned) beds.

CONCEPT OF RAMP-TYPE GEOMETRY IN THE YAKIMA FOLD BELT*

Fig. 4



*Section is meant to be diagrammatic.
Source: Courtesy of Exxel Energy Corp.

4. Reservoir pinchout/truncation along the flanks of highs.

5. Basin-centered gas accumulation (overpressure cell).

Of these types, the most prospective are interpreted to be 1, 2, and 5. A number of mapped closures are considerable in size (>10 sq miles) and may rank among the largest untested structures in the western US. Regional cross sections through the CRB show that some basement uplifts lie within the overpressure cell, while others extend above it.

Roslyn and equivalent rocks are erosionally thinned significantly over many of these highs. Thrust-related and pinchout traps in Roslyn and Wenatchee intervals can also occur within the zone of overpressuring.

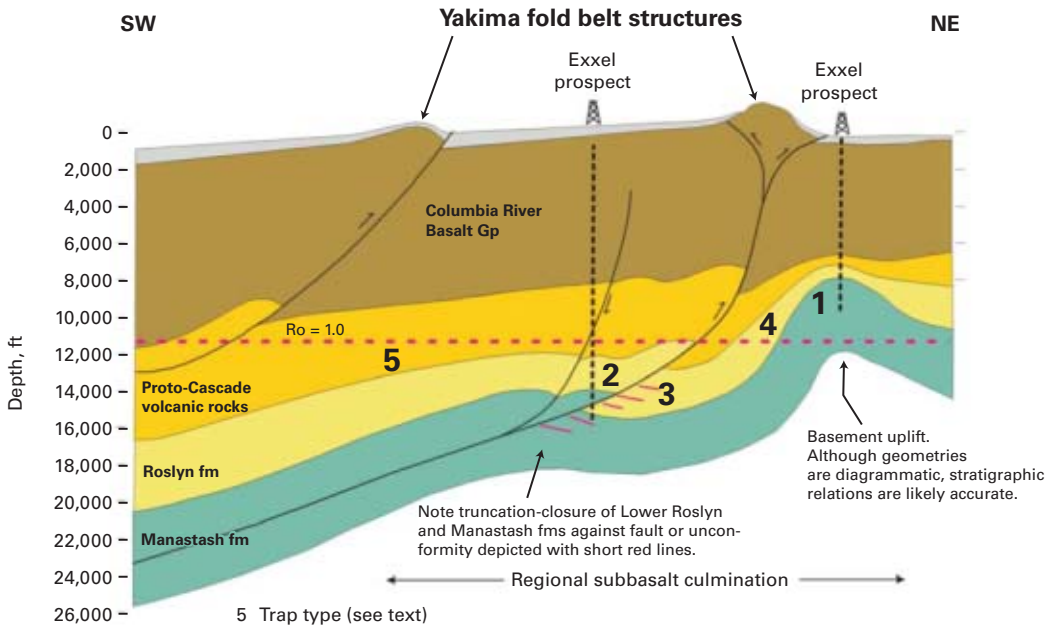
Gas distribution

It is well-known that gas is widespread in aquifers and water wells across the CRB. Older basin models interpreted such gas to have a biogenic or thermogenic origin within the basalt sequence. Isotopic analysis by Johnson et al., however, has helped establish a deep, coalbed source.[5]

At the same time, geochemical study of rock samples recovered from subbasalt tests in the basin, as well as mud weights, drillstem test data, and other information, together suggest the existence of a large overpressure cell in the basin.[6] Over much of the CRB, this cell corresponds with gas occurrence in low-permeability Roslyn and, to a lesser extent, Wenatchee sands and is thus interpreted to represent a basin-center accumulation. As shown by Fig. 6, top of this accumulation corresponds to a vitrinite reflectance of Ro = 1.0 and depths of around 11,000 ft.

Trap types in central Columbia River basin

Fig. 5



Burial history

Improved characterization of the subsurface allows for better understanding of geologic history and gas generation in the CRB.

It is apparent, for example, that Swauk and lower Roslyn sediments were deposited over a vast, westward-draining plain. This plain was subjected to deformation in Eocene-Early Oligocene (upper Roslyn) time, when oblique plate convergence and proto-Cascade volcanism generated NW-SE and NE-SW oriented faults and began segmentation of the CRB into the Pasco, Yakima, and Richland subbasins.

Rapid downdropping and filling of subbasin depocenters took place through the Oligocene, such that, by the time flood basalt extrusion began (17 m.y.), Roslyn coals and carbonaceous shales were in the early stages of gas generation.[7] A shift to north-south compression, coeval in part with the later stages of extrusion, generated the thrust-bound structures of the Yakima fold belt and continued subsidence in subbasin lows. Migration of gas into conventional traps and into low-permeability Roslyn and Wenatchee sandstones reached a maximum during the Mid-Late Miocene and continues today.

Taken together, these concepts strongly support the need to apply contemporary techniques of well completion in tight gas sands—specifically, multistage frac stimulation—to the Roslyn within the overpressure cell. Such techniques have proven enormously successful in unlocking the multi-tcf reserves of the well-known Jonah and Pinedale fields of the Green River basin, Wyo.

Indeed, like the CRB, neither of these giant fields was commercial during the first several decades of related exploration. Potential at Pinedale, in particular, had long been recognized in thick sequences of gas-bearing fluvial sands and shales of the Late Cretaceous Lance formation but had to wait for modern completion methods to be realized.

Multistage frac treatments, by which several stages of a reservoir can be

stimulated in fairly rapid succession, has opened new production in many tight formations of the US, including the Lance, Mesaverde, Barnett shale, and Bakken formations.

Redrill candidates

To date, log and test data are available from six deep wells in the CRB. Among these, five had flows of gas, mainly from sands in the Roslyn and Wenatchee formations.

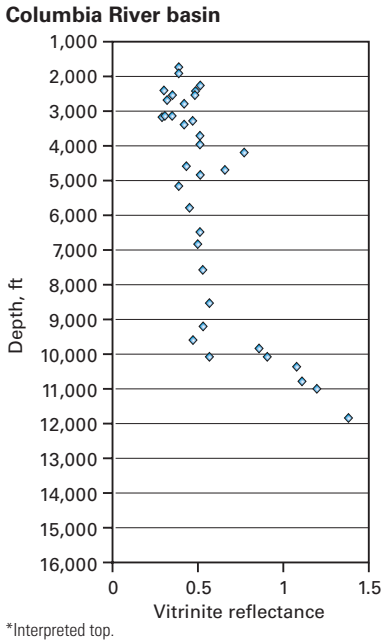
In only two of these wells—the Yakima 1-33 and BN 1-9 (see Fig. 1 for locations)—were stimulation and acidization applied to the Roslyn. These stimulations were small in scale and conventional for the time. Nonetheless, both wells yielded flow rates that would be considered commercial in most hydrocarbon basins. A summary of information from these wells is shown in Table 1.

The Yakima 1-33 was drilled at the intersection of an identified subbasalt thrust structure and northwest-trending horst and penetrated a large portion of the Wenatchee-Roslyn section (TD = 16,199 ft). Most of the Roslyn section at this location is within the overpressure cell, revealed by a gradient of 0.75 psi/ft at 11,700 ft.

Log analysis indicates a total of 35 potential reservoir zones, totaling 1,481 net ft (502 ft with maximum potential). Only 12 zones were tested, with a small frac (77,000 lb of proppant) applied to several sands at 12,350-460 ft depth, establishing a flow of 500 Mcfd. All nonstimulated zones produced smaller amounts of gas with little or no water.

The well also tested 570 Mcfd and 5,400 bbl of water from a thick zone (no frac) that included a significant portion of the Teanaway formation, indicating high permeability possibly due to fracturing. A new well drilled to intersect most or all of these zones, plus the Teanaway zone above the gas/water contact, defines a quality prospect in this vicinity.

OVERPRESSURE CELL* Fig. 6



*Interpreted top.

In the BN 1-9, the intended target was a thrust-bound closure in a deeper part of the basin. At this location, the basalt cover is 11,500 ft thick; thus both the Wenatchee and Roslyn formations occur within the zone of overpressure. The well reached TD at 17,518 ft and did not encounter the base of the Roslyn.

Examination of log data in comparison with that from wells in producing tight gas plays, such as the Pinedale anticline, suggests between 550 ft and 750 ft of potential net pay. Using conventional analysis, Shell identified 15 prospective sands, with 157 net ft, and tested a total of 11 zones (107 ft). Only two of these zones received fracs: one zone, in the lower Wenatchee (~12,800 ft), flowed 2.4 MMcfd; the other, in the Roslyn (~13,380 ft), yielded a rate of 3.1 MMcfd with 6 bbl of 30.2° condensate, with 3,965 psi flowing tubing pressure.

Core information on this deeper Roslyn zone indicated 7% porosity and 0.4 md permeability. Several of the more prospective zones, particularly within the Wenatchee, were not tested in this well.

Both of these wells demonstrate large volumes of producible gas. Given that they were stimulated with 1980s techniques on isolated intervals, it is reasonable to assume that much higher flow rates would have resulted if larger, multistage fracs were applied to a majority of prospective zones in each well. In one estimation, rates at the BN 1-9 could have exceeded 10 MMcfd had such stimulation been applied at the time.[8]

It is for these reasons that the two wells are currently under serious consideration for either reentry or offset. Specifically, depending upon hole conditions, the BN 1-9 presents a reentry opportunity, whereas the Yakima 1-33 would likely be offset, due to the large amount of water in the Teanaway.

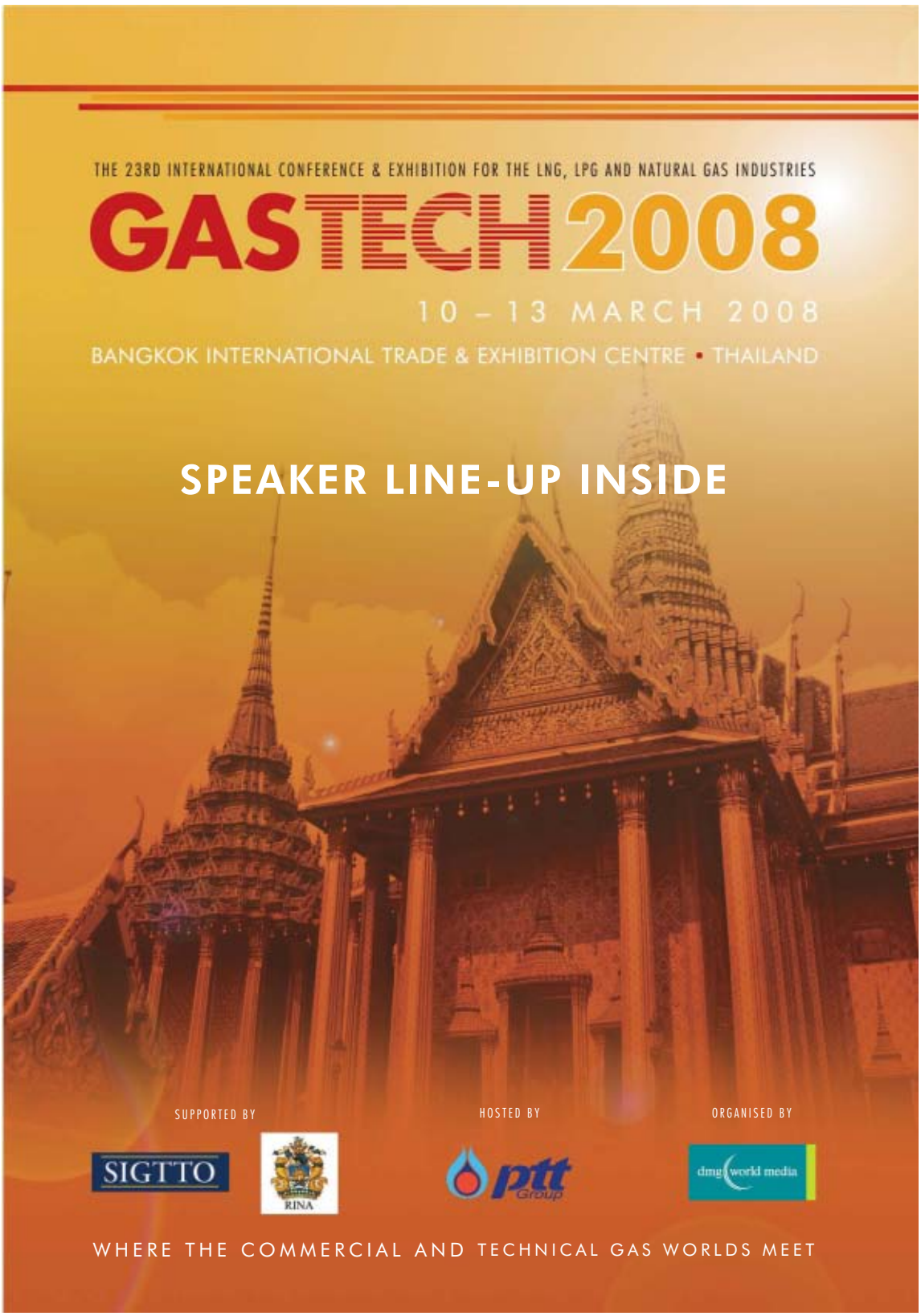
VALUES BASED ON SMALL, CONVENTIONAL STIMULATIONS Table 1

	Yakima 1-33	BN 1-9
Total depth, ft	16,199	17,518
Base of Basalt, ft	4,939	11,481
Base of Oligocene, ft	9,700	12,800
Base of Roslyn, ft	13,123	Did not encounter
Base of Teanaway, ft	14,041	Did not encounter
Gross pay section, ft	2,167	2,805
Net pay section, ft	502	582
Average density porosity, %	10	10
Density porosity range, %	7-14+	8-14+
Volumetric assumptions		
Water saturation, %	30	30
Porosity, %	10	10
Pressure	8,784 (0.75 psi/ft @ 11,713)	10,948 (0.75 psi/ft @ 14,597)
Fractured	Yes (limited)	Yes (39 ft)
Gas, MMcfd	1.4 (10,600-12,300 ft interval with no water tested)	5.4
Calculated gas-in-place		
640-acre spacing	294 bcfe/section	384 bcfe/section
80-acre spacing	36 bcfe/80 acres	48 bcfe/80 acres

Source: Exxel Energy Corp.

Reserves estimates

Based on data from these two wells, plus that from the other four subbasalt tests, resource and reserve estimates can be made.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One set of such estimates was generated in 1995 by Advanced Resources International Inc. (ARI), a research and consulting firm specializing in unconventional reservoirs.[8] Its figures provide an informative third-party assessment.

ARI defined three basic reservoir types: porous/permeable volcanics (e.g., Teanaway formation); conventional sandstones; and tight gas sandstones. Parameters chosen for each reservoir type are shown in Table 2.

CENTRAL COLUMBIA RIVER BASIN RESERVOIR TYPES Table 2

Description	Type 1	Type 2	Type 3
Sand type	Volcanics	Conventional	Tight (basin centered)
Permeability, md	25	1.0	0.05
Porosity, %	30	12.5	7
Gas saturation, %	70	70	60
Pay thickness, ft	100	100	300
Drainage area, acres	320	640	160
Depth, ft	12,000	12,000	10,000
Temperature, °F.	300	300	250
Gas gravity (air = 1)	0.6	0.6	0.6
Reservoir drive	Water drive	Water drive	Gas expansion
Initial gas in place, bcf	74.02	61.68	21.23
Est. reserves/well, bcf	47.58	39.46	14.73

Source: Data from Advanced Resources International Inc.

It should be noted that the tight sand reservoir type was not assessed on the basis of an identified basin-centered gas accumulation, since this interpretation had not yet been accepted for the CRB, and was posited at a shallower depth (10,000 ft). As a result, the estimate for this type should be considered below an appropriate minimum.

Recovery efficiencies were set at 64% for reservoir types 1 and 2 and at 69% for type 3 (tight sands), based on analogy to known reservoirs of similar composition. As shown, estimated per-well reserves for the different reservoir types range from about 15 to 48 bcf.

Gas-in-place figures supplied by Exxel Energy, meanwhile, calculated on the basis of data from the Yakima 1-33 and BN 1-9, specifically, are given in Table 1 (bottom portion) and can be compared with those of Table 2. Table 2 figures, which combine all reservoir types for each well, are considerable in size. At 69% recovery, they yield reserves of 25 bcf/80 acres for the Yakima well and 33 bcf for the BN 1-9.

These figures closely match those recently cited by Delta Petroleum for the BN 1-9 (30 bcf for 80 acres).[4] The scale of these numbers is directly tied to the large thickness of net pay (>500 ft), identified on the basis of integrated log and test data. It is to be noted that both Delta and Exxel report prospects ranging in size from 20,000 to 65,000 acres.

Risks and rewards

While the CRB offers huge potential, it remains a uniquely challenging province. Several primary risks, noted in the past, are apparent today as well. These include difficulty in accurately imaging the subbasalt section, mechanical uncertainties and high costs of drilling, and unknown reservoir performance.

As discussed, the first of these risks has been significantly reduced by contemporary geoscientific methods. Drilling uncertainties, related especially to the basalt and underlying volcanogenic Oligocene section, now appear under control, due to the successful approach adopted by EnCana at its three recent wells, employing reverse circulation.[9] Costs, however, remain significant. Risks related to reservoir performance, meanwhile, cannot be evaluated without actual production.

Exploration in the CRB may be at a critical stage. Relevant data indicate a large-scale gas resource in the basin, yet commercial production remains to be established. Further lack of success would likely dampen future drilling.

Yet the first well to achieve economic production would open a new chapter, not only for this unique frontier province, but, quite likely, for gas supply in the western US. In an era of elevated gas prices, the Columbia River basin may yet give new meaning to the old adage that claims exploration as a frequent drama of refound opportunity.

Acknowledgment

The author acknowledges Exxel Energy's exploration team for contributions to my understanding of the basin and this article. Their team includes Steve Boyer, Steve Reidel, Dale Bird (Bird Geophysical), Tony Gale, Eric Budsberg, Karen Christopherson (Chinook Geophysical), Paul Hammond, Robert Klipping, Ben Law, and Bill Lingley. I also thank Tim Walsh of the Washington Department of Natural Resources. ✦

References

1. Johnson, Samuel Y., Tennyson, Marilyn E., Lingley, William S., Jr., and Law, Ben E., "Petroleum geology of the State of Washington," US Geological Survey Professional Paper 1582, 1997, 40 pp.

2. Lingley, William S., Jr., "Petroleum potential and probability of renewed mineral-rights leasing in the Columbia Basin, Washington," Washington Department of Natural Resources, 1995, 43 pp.

3. Montgomery, S.L., "Investigating the Potential of the Pacific Northwest," Petroleum Frontiers, Vol. 2, No. 4, 1985, 75 pp.

4. Corporate presentation, Delta Petroleum Corp., Dec. 13, 2007 (www.deltapetro.com).

5. Johnson, V.G., Graham, D.L., and Reidel, S.P., "Methane in Columbia River Basalt aquifers: Isotopic and geohydrologic evidence for a deep coalbed gas source in the Columbia Basin, Washington," AAPG Bull., Vol. 77, 1993, pp. 1,192-1,207.

6. Law, B.E., "Columbia Basin—Basin-Centered Gas play 0503," in Tennyson, M.E., "Eastern Oregon-Washington Province (004)," in Gautier, D.L., Dolton, G.L., Takahashi, K.I., and Varnes, K.L., "1995 National assessment of United States Oil and Gas Resources—Results, Methodology, and Supporting Data," US Geological Survey Digital Data Series DDS 30, 1995, 1 CD-ROM.

7. Walsh, T. J., and Lingley, W.S., Jr., "Coal maturation and the potential for natural gas accumulation in western and central Washington State," in Salisbury, G.P., and Salisbury, A.C., eds., Fifth Circum-Pacific Energy and Mineral Resources Conference transactions, Gulf Publishing Co., 1996, pp. 667-685.

8. "Engineering Evaluation of Potential Production from Deep Columbia Basin Wells, Washington," report prepared by Advanced Resources International Inc., Nov. 29, 1995.

9. Rach, Nina M., "Custom-built rig uses reverse-circulation pipe to drill basalt," OGJ, June 11, 2007 (Vol. 105, No. 22), pp. 53-57.

The author

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China

CNOOC Ltd. has begun production from Jin Zhou 21-1 gas and oil field in Bohai Bay.

One well was making 3.53 MMcfd of gas as of late December 2007. Peak rate is expected to be 11 MMcfd from three wells and 1,000 b/d of oil from two wells.

JZ 21-1, about 10 km from JZ 20-2 gas-condensate field, is equipped with one unmanned wellhead platform, one pipeline, and one subsea cable.

CNOOC is operator with 100% working interest.

Colombia

Kappa Resources Colombia Ltd. spud the Acacia Este-2 appraisal well on the Las Quinchas Association Contract area in the Middle Magdalena Valley on Dec. 21, 2007.

The discovery well encountered oil in several Tertiary Mugrosa sands in July 2007 and produced a maximum 101 b/d of heavy oil with 5% BS&W, said interest owner Black Rock Oil & Gas PLC. Acacia Este-2 is ½ km from the discovery well.

Israel

Zion Oil & Gas Inc., Dallas, began field acquisition of a geophysical survey on the Asher-Menashe License between Caesarea and Haifa, Israel.

The company plans to shoot four seismic lines in the Ramot Menashe area and three in the Nahal Me'arot area totaling about 30 line-miles. Acquisition is to be completed by mid-January 2008.

The collected data are to help Zion choose an optimal drillsite on the Ramot Menashe lead and upgrade into a drillable prospect its Nahal Me'arot lead near the Asher-Atlit-1 well.

Romania

Sterling Resources Ltd., Calgary, plans to test an apparent gas discovery at the Doina Sister well on the Midia Block in the Black Sea off Romania.

Drilled by the Prometeu jack up, the Doina Sister well reached TD 1,275 m on Dec. 30, 2007, and topped the main Mio-Pliocene Doina reservoir at 1,139 m, 8 m deep to prognosis.

Initial log results indicate a high quality 21.5-m net reservoir section at 1,139-1,167 m with 26% average porosity. Further gas indications were noted down to 1,200 m.

The prospect is an analog to the existing Doina gas discovery, which tested gas at restricted rates of 17 MMscfd.

Sterling is operator with 65% interest. Petroventures Inc. of Australia has 20%, and Gas Plus International of Italy has 15%.

Tunisia

Storm Ventures International Inc., Calgary, acquired an interest in and became operator of the Cosmos and Yasmin concessions in the Gulf of Hammamet off Tunisia, said Benchmark Energy Corp., Calgary.

SVI plans to submit a development plan for the Cosmos concession in the first quarter of 2008 to Tunisian government authorities. SVI targets first production from Cosmos in the third quarter of 2009. Tunisia's state ETAP has a 20% back-in right on both concessions, which are in 100-165 m of water 45 km off Tunisia.

The Cosmos Sud structure was drilled and tested in 1983 and produced oil from Miocene Birsa sands, and a 3D seismic survey was shot in 1985 and reprocessed in 1995. Yasmin, which also tested oil from Birsa, was discovered in 1976, and a 3D survey was shot in 1986.

Louisiana

Daybreak Oil & Gas Inc., Spokane, reported completion of the Tensas Farms et al. A-1 well in Tensas Parish, La.

Cretaceous Basal Tuscaloosa perforations at 8,094-8,108 ft flowed 63 b/d of 39° gravity oil and 245 Mcfd of gas with 2,150 psi. FTP on a 64/64-in. choke on Dec. 5. On Dec. 20, the rate was 168 b/d and 496 Mcfd of gas at 1,850 psi on a 64/64-in. choke. TD is 8,200 ft.

Daybreak is operator with 34.75% interest after payout. The well is 2 miles northwest of the Tensas Farms et al. F-1 discovery well, placed on production in 2006.

The F-2 well, 3 miles southeast of A-1, is at TD 8,310 ft awaiting tests.

The company has more than 20,000 acres under lease in Tensas and Franklin parishes. The drilling targets are based on a 55,000-acre 3D seismic survey that covers the entire leasehold.

Peak oil models forecast China's oil supply, demand

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Peak oil models show a widening gap between China's oil demand and production. The generalized Weng model predicts a peak oil production in China of 196 million tonnes in 2026 and the Hubbert model indicates a peak oil demand in 2034 of 633 million tonnes.

Because forecasts indicate a widening gap between production and demand, China's government is undertaking various measures to reduce this gap and more measures will be needed in the future. In 2006, China imported 47% of the oil it consumed.

For predicting future oil production and demand in China, this article shows the results of three peak oil models: Hubbert, Generalized Weng, and HCZ.

Peak oil models

The Hubbert model, first published by M.K. Hubbert in 1962, correctly forecast the oil peak in the Lower 48 states in the US.[1,2] Chen Yuanqian in 1996 proposed use of the Generalized Weng model,[3,4] and Hu Jianguo, Chen Yuanqian, and Zhang Shengzong developed the HCZ model in 1995.[5]

The Hubbert model has been applied widely in the world, while application of the Generalized Weng and HCZ model has been limited to mostly China.

Although all these models forecast reserves and production of oil fields, they are seldom used to predict oil demand. Based on the theory that everything in the world follows the natural process of "rise-grow-mature-decay," we believe demand of oil would follow the same pattern and predicting oil demand with these models is feasible.

Table 1, shows the equations used in the three forecast models.

FORECASTING MODELS

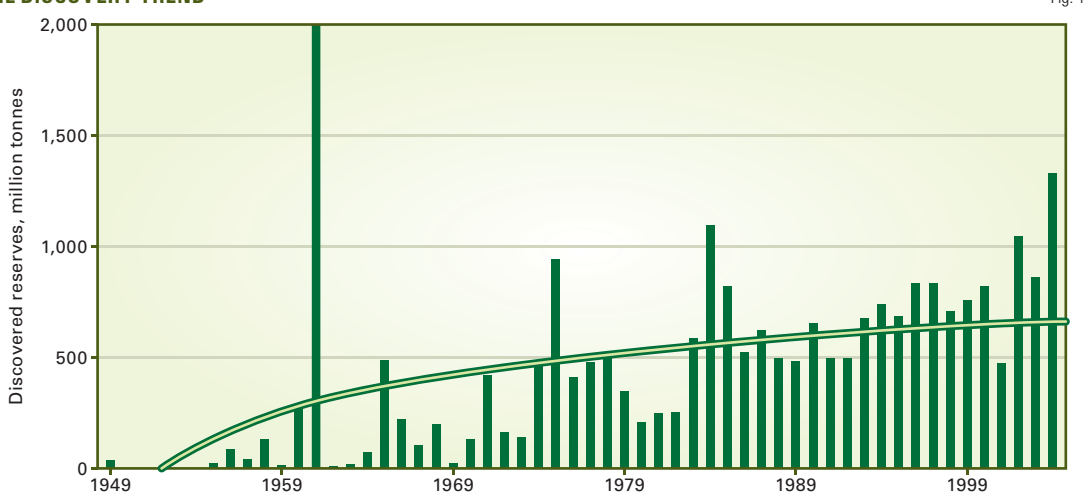
Table 1

Model	Basic equation*	Production equation for forecasting peak oil	Time equation for forecasting peak oil
Hubbert	$Q = \frac{abN_R e^{-bt}}{(1 + ae^{-bt})^2}$; $N_P = \frac{N_R}{1 + ae^{-bt}}$	$Q_{max} = 0.25bN_R$	$t_m = \frac{1}{b}\ln a$
Generalized Weng	$Q = at^b e^{-t/c}$; $N_R = ac^{b+1}\Gamma(b + 1)$	$Q_{max} = a(bc/2.718)^b$	$t_m = bc$
HCZ	$Q = aN_R e^{[-(a/b)e^{-bt}-bt]}$; $N_P = N_R e^{[-(a/b)e^{-bt}]}$	$Q_{max} = 0.3679bN_R$	$t_m = \ln(a/b)/b$

*Q—Annual production, million tonnes; Q_{max}—Maximum annual production, million tonnes; t—Development time, years; t_m—Time of maximum annual production, years; N_R—Recoverable reserves, million tonnes; N_P—Cumulative production, million tonnes; a, b—Constants in forecast models.

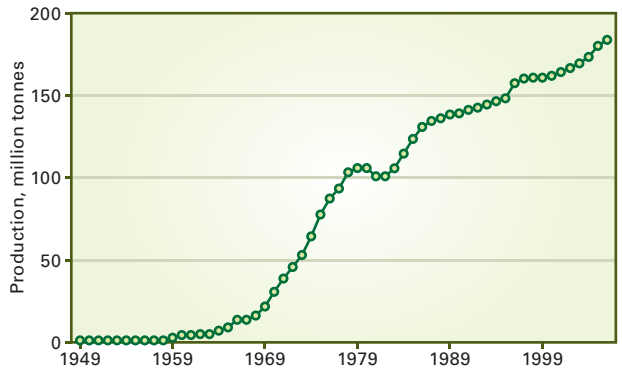
OIL DISCOVERY TREND

Fig. 1



OIL PRODUCTION

Fig. 2



Oil reserves

With improvement of technology and knowledge, China's discovered reserves have increased steadily (Fig. 1).

The increase of oil reserves in China can be divided into five stages:

1. 1907-49, oil discoveries in the Ordos basin and a few other areas.
2. 1950-64, large reserves found in the Songliao basin.
3. 1965-75, Bohai Bay basin development.
4. 1976-90, exploration and development in the east, offshore, and west.
5. After 1990, development began in the Tarim, Junggar, and Ordos basins, with production still increasing in these basins.

According to a 2005 assessment of oil and gas resources, China has 21.2 billion tonnes of recoverable reserves.

Oil production

From 1949 to 1957, oil production in China was less than 10 million tonnes/year (tpy). With the discovery of Daqing oil field, oil production increased continually in the 1960s and surpassed 20 million tonnes in 1969. The discoveries in Bohai Bay basin and the additional production in Daqing in the 1970s increased oil production by 10 million tpy, with production surpassing 100 million tpy in 1978.

Although the production increase slowed after the 1980s, it reached 184 million tpy in 2006 (Fig. 2).

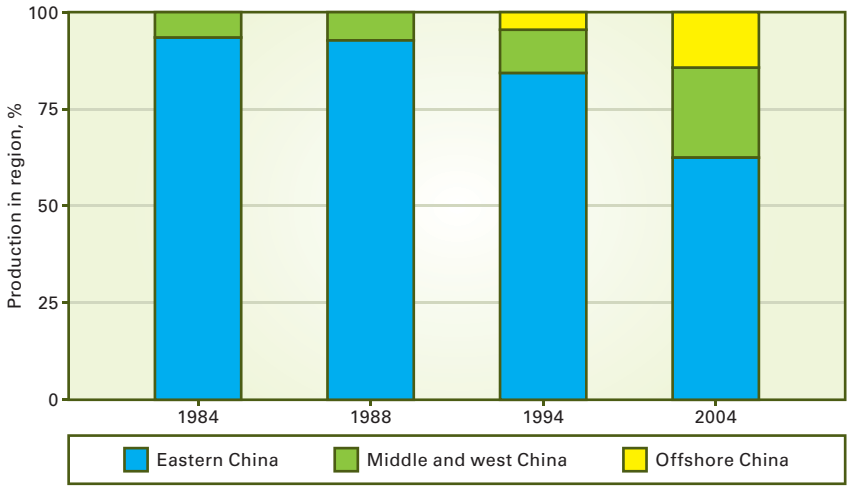
The oil fields in the eastern China are the main contributors to China's oil production, but with the extensive exploration and development of the Songliao and Bohai Bay basins, the production in the east has started a downtrend from the 1980s (Fig. 3). In 1984, eastern China produced 94% of China's oil, but this had decreased to 63% in 2004.

The decreasing oil production trend in the main oil producing areas after 30 years of increasing reserves and production means that a new stage of development for China oil industry has started.[6]

The percent of China's oil produced in middle and western areas has increased from 6% to 23% in the last 20

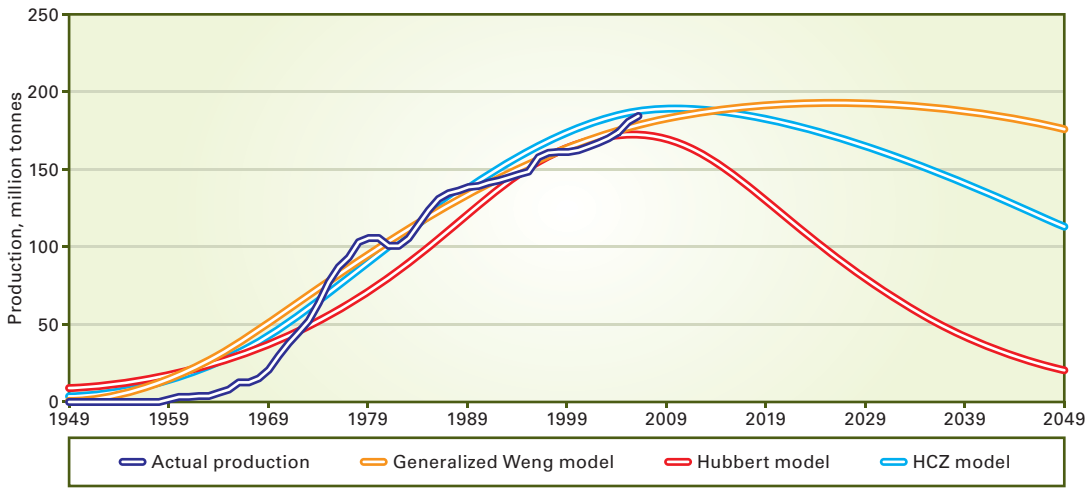
OIL PRODUCTION DISTRIBUTION

Fig. 3



OIL PRODUCTION FORECAST

Fig. 4



years, and these areas now have become an important source of China's oil production. The middle and western areas, especially the northwest, have the oldest oil fields in China. Exploration in China used to focus on these areas before the discovery of Daqing oil field in the east. But now again with the exploration successes in the Ordos, Junggar, and Chaidamu basins,[7] these areas have again attracted more attention.

Production off China also has increased. In 2004, it produced 14.08% of China's oil compared with only 0.27% in 1984. Offshore production may peak at 40 million tpy in the future.

Although production in eastern China continues to decrease, China's total production will remain on a plateau because of increases in the middle; west, and offshore.

Predicting oil production

Using a 21.2 billion tonne estimate for recoverable reserves in China, Fig. 4 shows the production forecast from the three peak oil models, and Fig. 5 shows the forecast from these models for individual fields. The three models provide different results (Table 2).

The Hubbert model was accurate for forecasting US crude oil production, but its strict symmetry has received criticism from experts who believe that the model underestimates future production.

Fig. 4 shows that the Hubbert forecast was less than the actual prior to the China's peak-oil rate and creates a very steep decline after the peak because of the model's symmetry. This most likely is not a representative forecast.

Because on the changing trend of China's oil production, peak-oil production will not occur as soon as forecast by the HCZ model. The Generalized Weng model, on the other hand, fits China's actual production well.

The Generalized Weng model shows China having a peak oil production of 194 million tpy in 2026. This is only about 10 million tpy more than current production.

The Generalized Weng model shows (Fig. 5b) that production of Daqing, Shengli, Liaohe, Xinjiang, and Changqing oil fields will remain a main source of oil production. The production from these five areas will account for 30% of the total production in China in 2050, with the remaining production coming from other regions.

China's middle and western areas will be an important source of oil production and will make up for the decreasing production in the east.

Oil demand

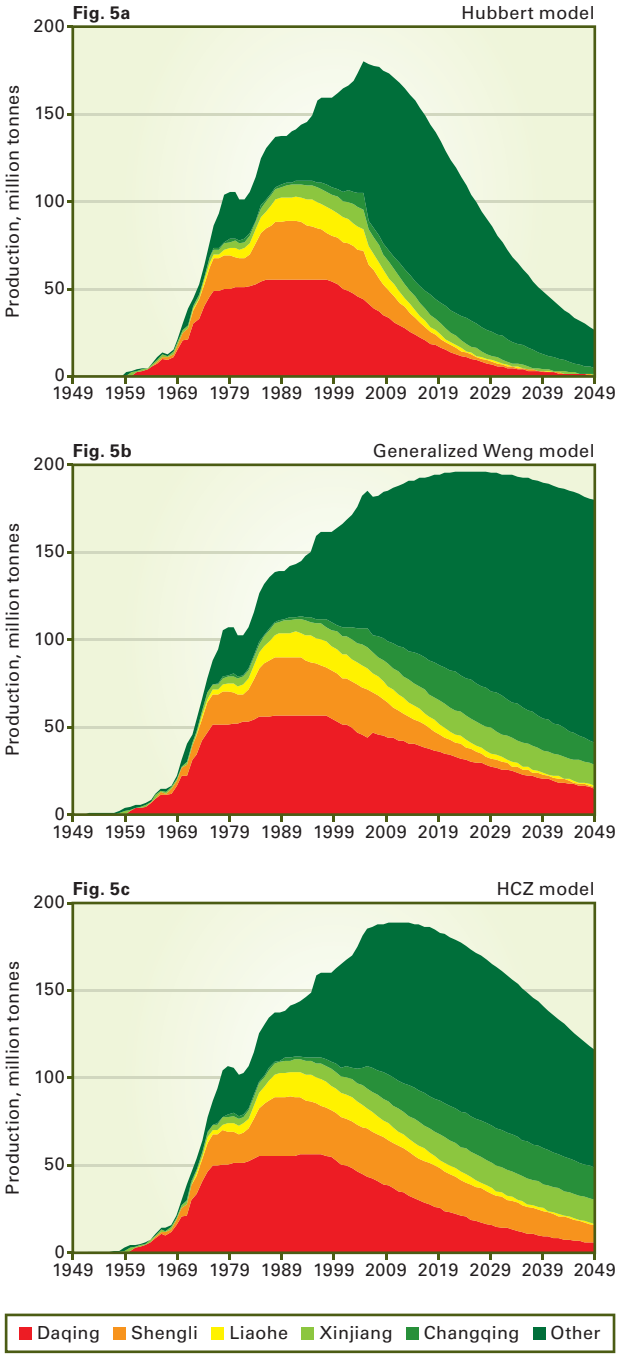
Based on the data from the National Bureau of Statistics of China, China's economy began to grow rapidly from the 1980s and even faster after 2000. Oil demand is proportional to the fast economy growth. Fig. 6 indicates that the correlation coefficient between China's gross domestic product (GDP) and oil demand is 99.5%.

The BP Statistical Review of World Energy 2007 says that China's oil demand growth is one of the fastest in the world, increasing by 7.4%/year in the recent decade. China's oil demand has reached 350 million tpy in 2006, second only to that of the US. Oil demand because of the fast growing economy still has a potential to grow rapidly. At the same time, China's oil production is growing slowly, only by 1.5% in the last decade.

This gap between demand and production has reached 166 million tpy, and it seems that the gap will become larger in the future.

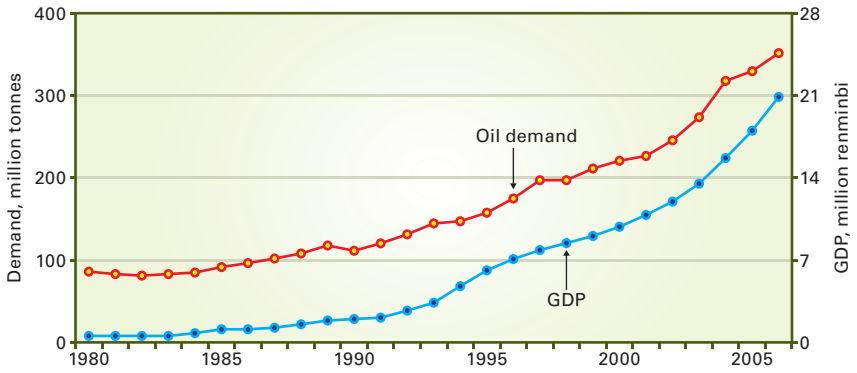
Oil production forecast by field

Fig. 5



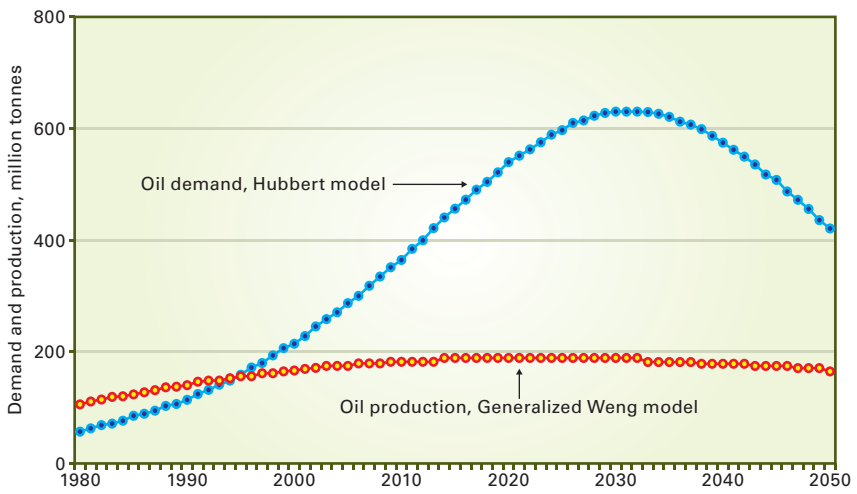
OIL DEMAND, GDP

Fig. 6



OIL DEMAND, PRODUCTION GAP

Fig. 7



Although the oil production forecast in China with the Hubbert model is low, its forecast of demand for oil is acceptable.[10] Our oil demand forecast uses the Hubbert model combined with oil consumption data in BP Statistical Review of World Energy 2007.

Fig. 7 shows that like oil production, oil demand also has a peak. The peak is reached in 2032 at 633 million tpy. The gap between demand and production continued to become greater after 1993, the year when China became a net oil-importing country. China's oil imports have increased yearly from 1993 and reached 166 million tpy in 2006. At the time of the predicted peak demand, the gap will reach 446 million tpy.

Table 3 lists the forecast result of oil production and consumption and the gap between supply and demand. After the peak demand, the gap will narrow because of the use of new energy sources and other measures, such as conservation.

The dependence on foreign oil has reached 47%, and the models forecast that the dependence will increase to 50% in 2010, 64% in 2020, and 69% in 2030.

Table 4 compares this import forecast with predictions made by the International Energy Agency (IEA) and the US Energy Information Administration (EIA).[11]

Narrowing the gap

Some experts think that the dependence on imports should not exceed 60%,[12] so that it is time for China to take measures for narrowing the gap between supply and demand.

One action is to speed development of petroleum resources. Fig. 5b shows that large oil fields remain the main contributors to domestic oil production. These fields have produced for a long time and require revitalization. These fields are all in eastern China, which remains the main producing area.

The eastern area inevitably will peak, and China needs to develop the oil fields further in the west, which has several prospective oil and gas basins. For example, the Changqing oil field can increase its production because it is a large multimillion tonne field.

In addition, China National Offshore Oil Corp. (CNOOC) is developing offshore oil fields and its production is increasing dramatically. Offshore has great oil potential and prospects and will become more important with sufficient technology development and investment.

In all, the feasible measures may include developing science and technology, improving the production in eastern oil fields, and actively developing prospects in western and offshore areas.

Another action is to cooperate with oil exporting countries to establish a strategy for oil reserves. The main oil resources of the world are controlled by oil exporting countries, especially the Organization of Oil Exporting Countries. These countries are the main power in the world oil market.

In the case of China, external dependency is becoming greater and this requires cooperating with these countries. At the same time, China is establishing strategic oil reserves to ensure availability of oil. These policies will lessen China's risk of not meeting the oil demand.

A third action is to expedite the development and use of natural gas and unconventional oil and gas resources. As a clean energy, natural gas holds much potential and China has large reserves. Natural gas has become more important

PEAK OIL FORECAST

Table 2

Model	Peak year	Peak production, million tpy
Hubbert	2005	172
Generalized Weng	2026	194
HCZ	2012	188

SUPPLY, DEMAND GAP

Table 3

Year	Oil production	Oil consumption	Gap
	Million tpy		
2005	181	327	146
2010	184	368	184
2020	193	536	343
2030	194	631	437
2050	178	420	242

IMPORT FORECASTS

Table 4

Year	This article	IEA	EIA
	%		
2010	50	61	54
2020	64	77	72

IEA—International Energy Agency. EIA—US Energy Information Administration

in China's energy mix as demand has increased, peak oil looms, and concerns for the environment increase.

Fig. 4 shows a peak for conventional oil, but China also has unconventional oil and gas resources, such as oil shale, coalbed methane, and gas hydrates. These await development and would help provide energy after conventional oil peaks.

Of course, development of these unconventional oil and gas resources still has technical problems, costs, and environmental issues to overcome. The key lies in technical innovation. Only after the industry solves technical problems can costs be reduced, environmental problems be readily solved, and the economical production of unconventional oil and gas resource be realized.

Another action China can take is to advocate conservation for improving energy efficiency. Quick economical development in China has led to increased oil demand and also caused energy waste and low energy utilization efficiency.

To resolve the supply and demand gap, China will have to improve supply and take measures to decrease oil demand by:

- Promoting conservation especially in high-energy-consuming industries and companies.
- Developing energy-economic vehicles.
- Developing and utilizing renewable energy.
- Strengthening management of power demands and hastening the construction of conservation service system. ✦

References

1. Hubbert, M.K., "Energy from fossil fuels," Science, Feb. 4, 1949, pp. 103-09.
2. Hubbert, M.K., "Degree of advancement of petroleum exploration in the United States," AAPG Bulletin, Vol. 52, No. 11, 1967, pp. 2207-27.
3. Weng, Wenbo, The Foundation of the Forecasting Theory, Beijing: Petroleum Industry Press, 1984.
4. Chen Yuanqian, "Derivation and Application of the Generalized Weng Model," Natural Gas Industry Journal, Vol. 16, No. 2, 1996, pp. 22-26.
5. Hu Jianguo, Chen Yuanqian, and Zhang Shengzong, "A New Model for Predicting Production and Reserves of Oil and Gas Fields," Acta Petrolei Sinica, Vol. 16, No. 1, 1995, pp. 79-86.
6. Zhang Kang, "View on the Potential in the Old Oil Regions in the Eastern China According to the Remnant Recoverable Reserves Change Within Recent 20 Years," China Petroleum Exploration, Vol. 6, No. 2, 2003, pp. 1-12.
7. Chen Yongwu and He Wenyuan, "Some recognitions of the petroleum geological feature and exploration directions in the western China," Acta Petrolei Sinica, Vol. 25, No. 6, 2004, pp. 1-7.
8. Zhang Kang, Life cycle and strategy substitution of oil field, Beijing: Geological Publishing House, 2001.
9. BP Statistical Review of World Energy 2007, from http://www.bp.com/reports and publications.
10. Zhao Qingfei and Chen Yuanqian, "Forecast and Analysis of China's Oil Consumption and Crude Oil Supply," Oil Forum, Vol. 006, No. 2, pp. 26-28.
11. Energy Strategy Research Group, China Science Academy, Research on China's Sustainable Development Strategy of Energy, Beijing: Science Press, 2006.
12. Qiu Zhongjian, and Fang Hui, "Some Opinions about Sustainable Development of Petroleum Resources in China," Acta Petrolei Sinica, Vo. 26, No. 2, pp. 1-2.

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Systems approach improves start-ups

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The systems approach to start-up helps reduce construction man-hours by eliminating duplication of effort, which is useful in itself. It is an extension of the systems approach to construction, which involves the precommissioning team working closely with construction, beginning with the hydrotest of the systems.

The real benefit, however, is allowing customers access to the systems sooner so that they may begin to make use of them and keep their workloads more uniform during precommissioning of the project. The Construction Industry Institute (CII) is correct in stressing that the systems approach must be implemented before construction begins, so that all parties are committed to it.

The prioritization of the systems through implementation of the Precommissioning Intensity Index should be performed as early in the project as possible. Doing so can eliminate much time, money, and operator and maintenance stress.

Systems

Any particular process unit in a refinery is an assembly of many systems, each of which consists of a group of equipment with interconnecting piping and instrumentation that collectively serves to perform a specific function or purpose. This can be something as large as a complete fractionation system—such as a debutanizer complete with its reboiler, overhead condenser, accumulator, and all other associated exchangers, pumps and piping—or as small as the cooling-water distribution piping for its overhead condenser.

The construction industry has been building process units on a system basis for years. Now the CII has established a concept for precommissioning plants on a system basis as well.

Precommissioning is defined as all the activities required to prepare a system for commissioning and start-up such as punch listing, cleaning, flushing, loading of packing and catalyst, and final assembly and closure of equipment. With proper controls, air freeing or inerting of equipment could be included as part of the precommissioning phase.

Commissioning is defined as actually putting those systems into service. If the equipment in a system was not inerted at the end of the precommissioning phase, it definitely must be at the beginning of the commissioning phase before normal operating fluids (hydrocarbons, for instance) could be brought in.

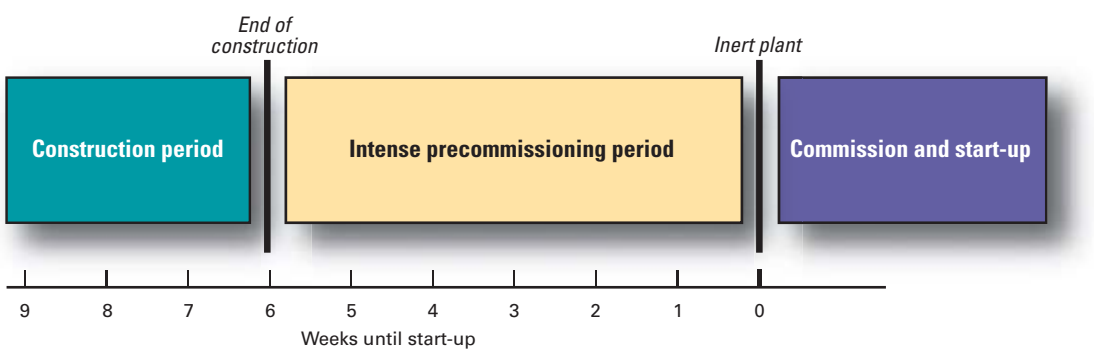
Constructing by systems

A system consists of a group of equipment with interconnecting piping and instrumentation that collectively serves to perform a specific function or purpose.

Because of this common purpose, all of the piping in a system is usually fabricated from the same line class.

TYPICAL PRECOMMISSIONING METHOD

Fig. 1



That defines the pressure rating, metallurgy, and any need for postweld heat treating of piping in the system. That is why construction has been using the systems approach for some time now.

It makes sense to group the piping together for a common hydrotest if there is an entire sequence of equipment at the same pressure rating. If it happens to be fabricated from stainless steel or high-chrome carbon steel, then either water with low levels of chloride or postweld heat treatment would also be required. There are therefore many practical reasons for construction to build units on a system basis.

There are also many other practical reasons from an operations standpoint for precommissioning purposes to build units on a system basis. Once a system has been successfully hydrotested by construction, the precommissioning phase may begin. This involves flushing lines to clean them and remove debris.

Once that is done and the system reassembled, functional testing of equipment can be performed. This includes, but is not limited to, such tasks as bumping and running motors and steam drivers, setting overspeed trips, cold alignment of pumps, stroking control valves, and performing loop checks.

Precommissioning systems

In the past, it was not uncommon for the contractor to complete the entire plant before any precommissioning work began (Fig. 1). The new method, which CII fosters, is to begin precommissioning of a system once construction has finished hydrotesting it. This also allows the customer to make use of each system much sooner.

Use does not necessarily mean putting the system into commission or operation. But it does mean all of those things up to that point, such as operator familiarization with the system or spreading out the workload on the customer's personnel to a more manageable level.

That could allow the customer to have the entire plant inerted just a few days after the last system is turned over and possibly commissioned and up and running a few days after that.

This takes a great deal of coordination between construction and operations, but it can work to the benefit of both. For instance, it is common for the contractor to remove equipment and pressure-sensitive instrumentation from a system for the hydrotest. Then the whole system must be reassembled (reinstating) after the hydrotest.

This was necessary before the customer would accept or buy the plant. Then much of this equipment would be removed again for flushing and cleaning, and subsequently reinstalled.

Now with proper coordination, the flushing and cleaning portion of the precommissioning phase occurs directly before or after the hydrotest, often with the same water or fluid. This is particularly true if a special water or fluid for metallurgical or freezing considerations must be used for the hydrotest.

Then system equipment can be reinstated for the first and only time, which saves having to handle the equipment several times. This also minimizes the precommissioning manpower requirements for the customer.

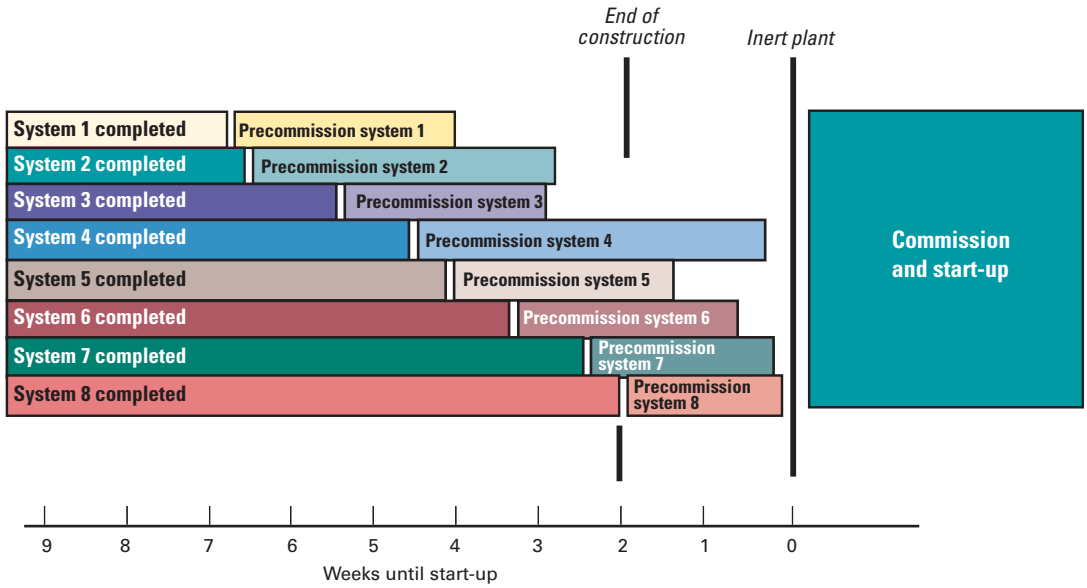
Because the contractor cannot possibly hydrotest all systems at the same time, the customer will not have to perform the precommissioning on all of the systems at the same time either.

Instead, system precommissioning can be handled in a phased approach by turning the systems over to the plant owner one at a time, so that the owner's workforce will only be dealing with one or two systems at any given time (Fig. 2). This is important because the owner will not have the same manpower resources that the contractor can have.

Instead of having to work a lot of overtime, the owner can work on the

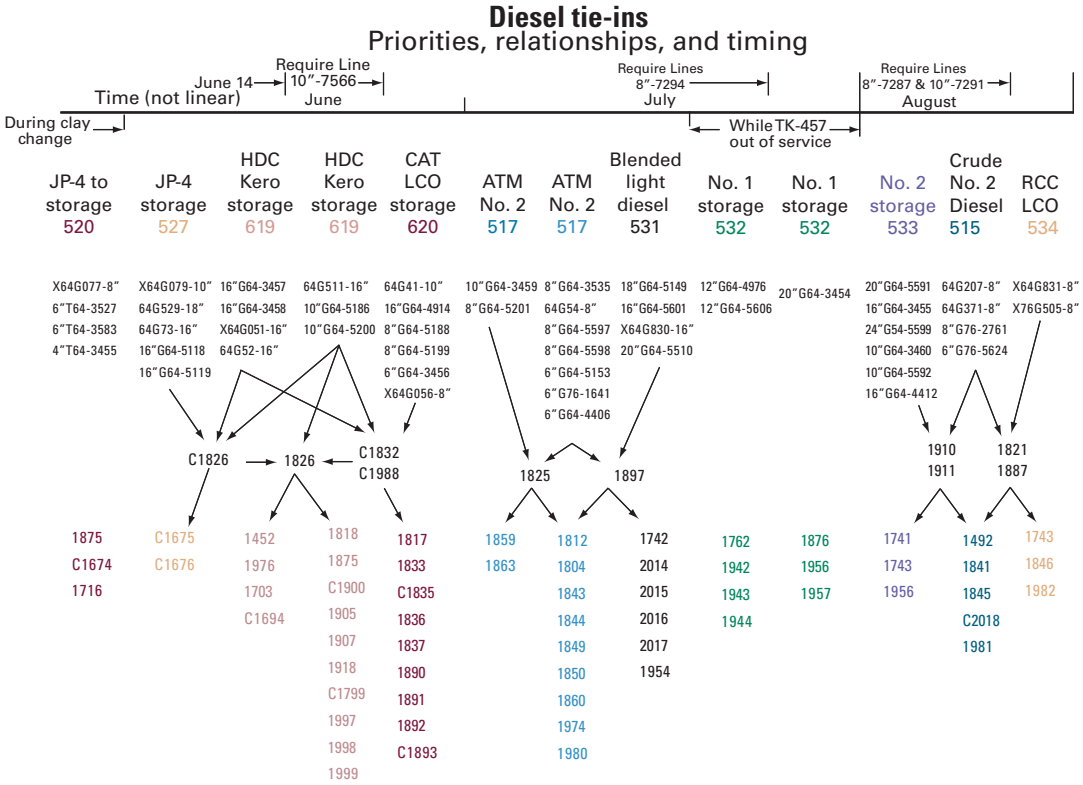
SYSTEMS APPROACH TO PRECOMMISSIONING

Fig. 2



SAMPLE TIE-IN WORKSHEET

Fig. 3



systems in an orderly manner, which also facilitates operator training. Start-ups will also be smoother because the operators are not tired and stressed from long periods of overtime.

The benefit to the contractor for this is a longer construction time frame. Instead of having to complete construction typically 6 weeks or more before start-up, end of construction on the last few systems can be as late as a couple of weeks before start-up. Average end of construction is therefore only 2-3 weeks before start-up, which gives construction 3-4 more weeks to work.

This does require making some of the utility systems "hot" during construction, which requires extra safety precautions and vigilance. Although use by the owner does not mean commissioning of systems, there are some exceptions.

Typically those are steam, condensate, instrument air, and electrical power—utilities that are required for functional testing of the equipment. All of these are hazardous because of their high energy potential. But steam is the most onerous because it can also cause severe burns. Insulation on it must therefore be complete before it can be put into service.

A prime example of this occurred in the fall and winter of 1977 when I was the project manager for what was then Plateau, Inc., for the relocation of an fluid catalytic cracking unit from Winnipeg, Man., to Bloomfield, NM. Due to the death of the original field superintendent followed by a series of failed attempts at replacements, the construction force had essentially no direction and was confused about what to do next.

At this point I divided the main column and gas concentration unit into systems so that construction workers could focus on one section at a time. The depropanizer and propane-drying column was one section, the debutanizer was the next section, the recovery section was the third, and the main column with all of its pumparounds was the fourth section.

We started with the depropanizer. As soon as it was complete, the operators performed the hydrotest and flushing with that system's pumps and worked forward through the plant to the debutanizer, followed by the recovery section and then the main column.

By this point, I had assumed the position of acting field superintendent for the contractor as well, and was developing priorities and work lists for each section. This unique situation allowed the required coordination to make this approach work.

Another unique facet of this project was that we operated the main column and gas concentration unit as a crude unit for 16 weeks while the regular crude unit was being revamped to produce the required feed for the FCC. I did not realize it at the time, but this allowed me to make use of operations and maintenance staffs.

By the time the crude unit was back on line and the FCC reactor structure was complete, we had all of the bugs worked out of the downstream portion

of the FCC, and the operators were very familiar with its operation.

Although this was an extreme case of making use of systems, it is the epitome of what it means. When we pulled the blind on the reactor vapor line to start feed to the riser, we only had to worry about and concentrate on the operator's first-time exposure to circulating catalyst and operating an FCC reactor and regenerator.

Optimize the schedule

Although it is easy to see graphically that the new method promoted by CII makes a lot of sense, there is really much more to it. Just completing the systems in a phased approach still does not optimize the completion of the construction and precommissioning phases of the project.

Proper optimization will determine which systems should be completed first and which ones can be completed last. Because some systems are much more complex than others, it is simply practical to complete and precommission them first, to keep them from becoming critical.

Fig. 2 shows this. Precommissioning requirements and time involved on some complex systems will take longer than on simple systems. Some systems might be more important than others, and they too should be completed earlier rather than later.

On some large projects there will undoubtedly be many complex systems. In that case, it is practical to intersperse them among some simpler systems so that operations does not have to deal with too many complex systems at the same time, and it helps to smooth the customer's workforce.

During the winter 1999-2000, myself, a team of three other process engineers, and a score of pipe designers was charged with designing 350 tie-ins in the off site areas required for the start-up of a large refinery expansion on the Canadian East Coast. These were for the new feed and product lines between the new units and the existing tanks and for new lines and manifolds in the gasoline and diesel product blending systems.

Through careful evaluation and systemization of the lines and their tie-ins, we developed a strategy to implement the tie-ins in both product-blending areas without any effect on their day-to-day blending operations.

Fig. 3 shows an example of the worksheet used.

The systems are prioritized from left to right. Critical tie-ins for each system are in the center of the figure. Once we established those tie-ins, that whole system could be isolated to install the rest of its tie-ins. In this manner, only one blending pump was taken out of

PRECOMMISSIONING INTENSITY INDEX

Table 1

System	Number	Flush	Chemical clean degrease	Air blow	Test and set PSVs	Bump and run motors	Cold align drivers	Perform loop checks	Air free	Inventory fluids	Start-up	Precomm. intensity index	Priority group
Fire water	100	X								X	X	Low	First
Storm sewers	110	X									X	Low	First
Oily water sewers	120	X									X	Low	First
Closed drain system	130	X									X	Low	First
Potable water	140	X	X							X	X	Medium	First
Utility water	150	X								X	X	Low	Last
Cooling water	160	X				2	2	X		X	X	Medium	Second
Tempered water	170	X				2	2	X		X	X	Medium	Last
Plant air	200			X						X	X	Low	Last
Instrument air	210			X						X	X	Low	First
Nitrogen	220			X					X	X	X	Low	Last
Reactor feed	500	X		X	X	2	2	X	X	X	X	High	Sixth

service at any time. Because each pump was manifolded with at least one other pump, it was possible to work systematically through the systems without interfering with the blending operation.

This was a successful effort to prioritize and manage the work to the benefit of the refiner, which up until then was concerned with the potential for any loss of blending time. It is a good example of the use of systems for this purpose.

Precommissioning Intensity

The final element required to make the system approach workable is to set the priorities of which systems are required first and which can be last. The precommissioning intensity index (PCII) was specifically developed for this purpose.

Through a critical examination of all of the systems, the proper sequence for completing them should ideally develop before construction. Tracing and insulation are also time-consuming activities; therefore, emphasis is also placed on completing those systems before others. That also clears the unit of scaffolding sooner, which reduces the safety risk during the later precommissioning and subsequent commissioning efforts.

To develop the PCII properly and to prioritize the systems-completion sequence require someone knowledgeable and experienced to know what is really going to happen during precommissioning. Someone who can minimize the critical path and can keep the precommissioning path simple is needed.

Table 1 is an example of an abbreviated spreadsheet for determining the PCII of some systems.

For example, it is often incorrectly assumed that all of the utilities must be precommissioned first. In reality, many of them do not. Plant water, plant air, fuel gas, nitrogen, flare, and possibly many others depending on the plant are simple systems that can wait until the last minute for completion and precommissioning.

Some would argue that those systems are needed for precommissioning the process systems, but that is not always true. If a lot of water is needed, for example, the process water system will not do much good. In reality, the fire water system can be used.

I have cured many refractory liners with outside heat-treating contractors without using the unit's fuel-gas system. The cure has always been much better than operations could have done because it can apply the heat much more uniformly. This might also change the timing and priority for any system that requires refractory curing and avoids making them part of the critical path.

For example, during summer 2000, I helped relocate and recommission an FCC reactor regenerator structure. I recommended that the refiner use Cooperheat to cure the new refractory liner in the regenerator and the other refractory patches in the riser and reactor.

We had a natural gas source in a nearby unit and installed a temporary 2-in. line from it to Cooperheat's control station. Cooperheat performed the cure during a holiday weekend, when no construction workers were in the plant, and executed a superb cure.

The vendor did this without having to completely head up any of the vessels. This completely removed the cure and all of the systems required for it from the critical path and streamlined the first start-up immensely.

In retrospect, this turned out to be an expedient decision because the air blower's start-up was delayed a few days due to electrical switchgear problems. If the refractory cure had still been ahead of us, the refiner's patience would have snapped. Because of our decision, however, we did not have to perform the cure or the always debatably and time-consuming postcure unheading for refractory inspection. Once we had the air blower in operation, it was full steam ahead.

Tripping hazards

Although there are successes with the systems approach to start-ups, there are also difficulties. Even though the benefits for its use are obvious, there are a few things that can still trip it up.

Plant owners must beware of:

• *The contractor's field supervisors.* Even though the contractor's general managers might have bought into the program wholeheartedly from the beginning, many times their field supervisors have not. It takes much effort and determination to keep it going. Because they are charged with showing progress with good productivity, they will be hesitant to try something new. They would prefer to gang a whole geographic area of the plant to minimize their resources before relocating those resources to move onto the next section.

What really happens in the field, therefore, is to construct the plant in whole blocks until about 70% completion, and then move to systems. It is at this point that the issue must be emphasized.

• *The engineering group.* The owner and contractor can agree on the systems approach, but the contractor will be unable to implement it if the detailed engineering is incomplete. This can be a problem with fast-tracked jobs. This may mean the owner must be flexible and willing to do some trading between systems to accomplish the end result.

• *Equipment vendors and process licensors.* Everything can be going perfectly until vendors and licensors show up, because when they do, they want to punch out everything that has to do with their equipment or process. That can confuse and demoralize contractors, because they can begin receiving punch lists for systems that have not yet been completed or turned over.

The owner can be taking a lot of care with the contractor and then have the whole thing blow up over this. The owner must act as a filter between them and the contractor.

• *Instrument and electrical technicians.* Of all of the maintenance crafts, this one presents the greatest obstacle. Instrument technicians are resistant to performing individual system loop and continuity checks on a daily basis. They would rather wait until the end of the week, and then do them all. It takes a strong maintenance supervisor to overcome this inertia. ✦

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GAS TURBINES—1

Supersonic ejector captures, reinjects leaked vent gases

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John Geerligs
NOVA Research & Technology Center

Hasan Imran
TransCanada Corp.
Calgary

A two-stage supersonic ejector can capture low-pressure gas such as that being vented from a typical first stage dry-gas seal, and discharge it for re-injection into a higher-pressure stream at 3,400 kPa (atmospheric) for fuel-gas utilization.

The ejector device seeks to capture gas leakage from a dry-gas seal at low pressure and reinject it into the fuel-gas line to the gas generator (without the use of compressors or rotating elements), allowing the use of gas that would otherwise be vented to atmosphere. This device eliminates costs associated with gas loss and reduces greenhouse gas emitted by the dry-gas seal to the atmosphere.

Leakage gas pressure of 70-340 kPa (gauge) presents one of the primary problems mitigating against reaching these goals, with a minimum pressure required downstream of fuel-gas regulators of 2,400-3,400 kPag.

The device consists of a two-stage supersonic ejector. The first stage is highly supersonic (nozzle exit Mach 2.54), while the second stage is moderately supersonic (nozzle exit Mach number ≈1.72).

Several tests conducted on various configurations of the two stages on natural gas arrived at the optimum design and operating parameters. The optimum design gave an expansion-pressure ratio (motive:suction) on the order of 14.0 and compression pressure ratio (discharge:suction) of around 8.1. These ratios would meet the requirement of minimum suction and discharge pressure mentioned above.

This first part of two articles summarizes the optimum configuration arrived at after several iterations of different geometries of the supersonic nozzles, particularly for the first-stage ejector. The second, concluding article presents the performance-test results of the integrated system and describes a successful implementation of the supersonic ejector unit at one of TransCanada PipeLines' compressor stations in Alberta on a compressor-gas turbine unit rated at 24 Mw.

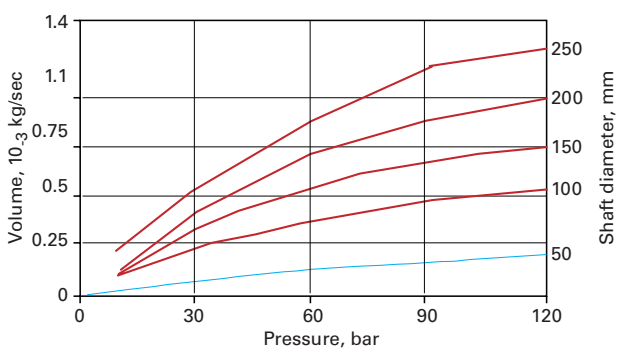
Background

Ejectors have the advantage of no moving parts. No seals, no shafts, no packing, and therefore no maintenance also stand out as distinct advantages over mechanical compressors or vacuum pumps, which often require elaborate maintenance programs. Their rugged construction and simplicity of design enable reliable, maintenance-free use.

Although considered inefficient in general, ejector use in a wide range of industrial applications—such as power plants for the creation of vacuum,[1] power and thrust augmentation,[2,3] refrigeration and heat pump systems,[4-6] gas-vapor recovery from oil storage tanks, transport of solids,[7] oil production,[8] aero-

Based on presentation at the 17th Symposium on Industrial Application of Gas Turbines, Banff, Alta., Oct. 15-18, 2007.

TYPICAL DYNAMIC GAS LEAKAGE RATE* Fig. 1



*First stage dry-gas seal.

engine cooling,[9] bubble-bed tower reactors, and bioreactors[10]—has become common.

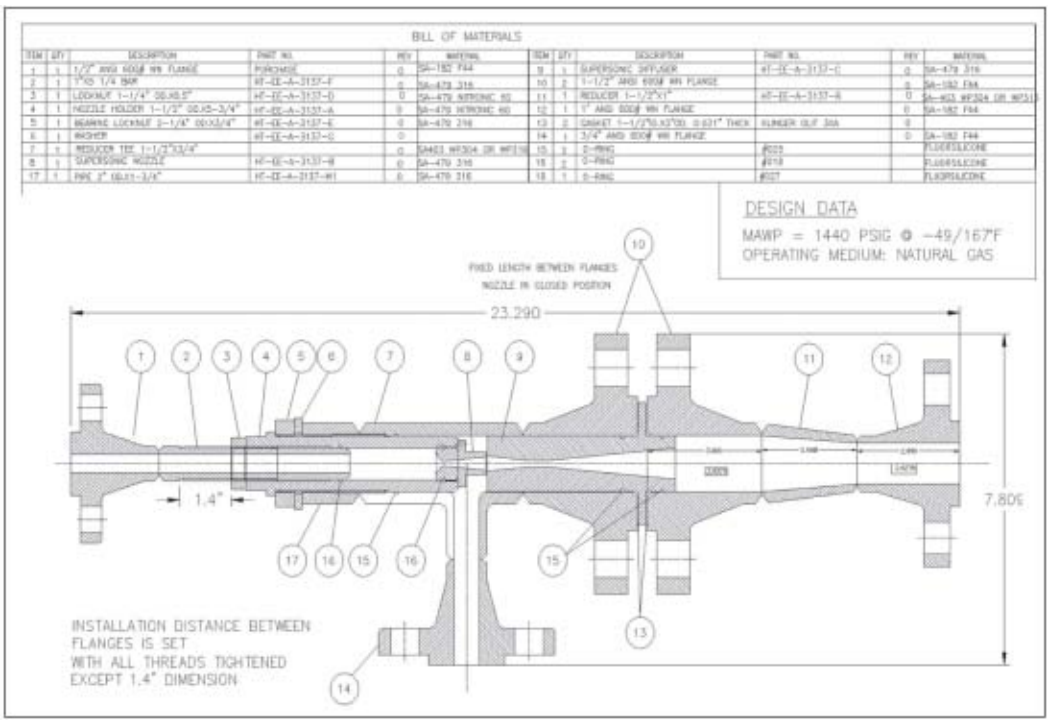
Current work focuses on extending application of ejectors to capture gas leakage from dry gas seals and reinject it into a higher pressure fuel-gas stream going to the combustor of the gas turbine driving the gas compressor.

Such use would not only save the leaking gas and use it as part of fuel gas, but also eliminate hydrocarbon emissions. It would also eliminate the need for additional energy to drive the ejector, drawing its motive gas from the fuel-gas line prior to throttling.

Reinjection of the leakage gas into the gas generator fuel-gas line presents a better option than directing it to a lower pressure utility fuel-gas line (e.g., in boilers) because boilers typically operate intermittently (on-off), instead of firing continuously while compressor units are running.

Leakage gas pressures from the first stage dry-gas seals in the range of 70-340 kPag, with minimum pressure required downstream of the fuel-gas regulator (typically Fisher 310A type) in the range of 2,400-3,300 kPag, depending on the gas-turbine model, pose the primary problems facing reinjection. Commercial ejectors typically work either in the subsonic or slightly supersonic regions, limiting suction pressure with respect to motive gas pressure.

Fletcher, for example, documents a discharge pressure calculation curve showing motive gas at 7,000 kPa-a and suction-gas pressure of 350 kPa-a yield a maximum discharge pressure achievable at about 1,400 kpa-a.[11] The same curve shows a motive pressure of 7,000 kPa-a, and a discharge pressure of 2,800 kPa-a, create a minimum suction pressure of 900 kPa-a.



The need for an ejector with a highly supersonic exit flow and compression of this flow after entraining the dry-gas seal leakage in a supersonic diffuser led to plans for the flexible prototype shown here. The design also minimizes the effect of the shock wave at the throat of the supersonic diffuser (Fig. 2).

The same study also showed that, for a discharge pressure of 4,100 kPa-a and a suction pressure of 1,300 kPa-a, the required motive-gas pressure would be 10,300 kPa-a, demonstrating the difficulty of meeting the low suction pressure while discharging to a much higher pressure.

Overcoming these difficulties prompted development and testing of a two-stage supersonic ejector[12] using a highly supersonic first stage (nozzle exit Mach number = 2.54) and a moderately supersonic second stage (nozzle exit Mach number = 1.72).

Several tests of various configurations of the two stages on natural gas yielded optimum design parameters; an expansion pressure ratio (motive-suction) on the order of 14.0 and compression pressure ratio (discharge-suction) of around 8.1.

This article presents the optimum configuration arrived at after several iterations of different supersonic expansion nozzles, particularly for the first stage, and presents the measured performance results of the integrated system that would meet the requirements of capturing the low-pressure, low flow dry gas seal leakage and reinject it into the fuel-gas stream.

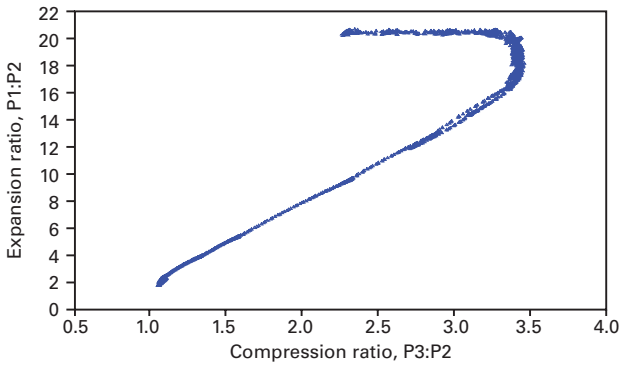
Dry-gas seal vent-gas pressure matching the pressure of the suction gas to the first-stage ejector should not adversely affect operation of the dry-gas seal, as will be discussed later in this article.

Leakage rates

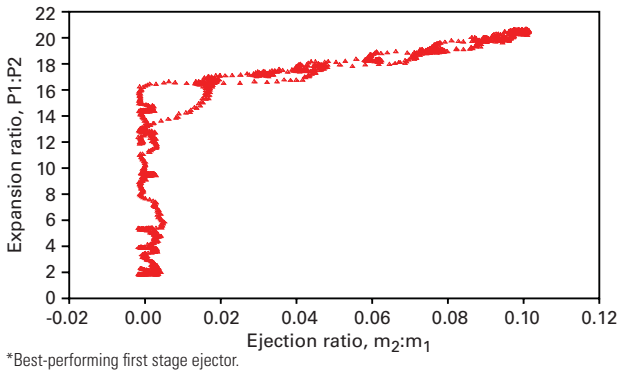
A typical dry-gas seal is a noncontact end-face seal with a sealing mechanism consisting of two rings. The first ring, with grooves etched in the seal face and rotating with the shaft, is the mating ring. The second ring has a smooth face and is restrained from movement except along the axis of the shaft. These seals often co-exist as pairs, providing a two-stage sealing effect.

Successful operation requires supplying a steady flow of clean seal gas to the gaps between the rings. The seal supply gas source must maintain a

BEST-PERFORMING FIRST STAGE EJECTOR CHARACTERISTICS Fig. 3



EJECTION MASS RATIO* Fig. 4



*Best-performing first stage ejector.

higher pressure than the process gas being sealed for flow to occur. Overhung compressors require just one dry seal, allowing seal supply gas to be drawn from the compressor discharge, filtered, and supplied in a steady flow to the seal capsule.

Most seal supply gas reenters the process cavity, with a small volume (leakage) passing through the seal faces and venting to atmosphere. The amount of gas leakage depends on the process pressure and rotating shaft diameter.

Fig. 1 gives an example matrix of the order of magnitude of gas leakage from a typical first stage dry-gas seal.

Current supersonic ejector development focuses on providing a means of capturing gas leakage and reinjecting it into the fuel-gas line, saving fuel and reducing greenhouse-gas emissions.

Supersonic problems

Supersonic ejectors' primary problem is compressing the combined (motive + suction) gas in the supersonic diffuser part of the ejector. The diffuser throat has to be larger than the nozzle throat to account for stagnation pressure losses both through jet entrainment-mixing and at the inlet of the converging supersonic section of the diffuser. An insufficiently large diffuser throat would cause a standing shock inside the nozzle and destroy the desired expansion in static pressure.

A variable throat diffuser can swallow standing shock[13 14] but complicated design too badly to be used in this application. A diffuser throat made slightly larger than needed instead kept standing shock either slightly downstream of the diffuser throat or at the throat itself.

Computational fluid dynamics analysis carried out to discern the flow field, accompanied by extensive testing of various configurations, helped reach the optimum design of a fixed-geometry diffuser that could work with different nozzles of different throat area. Previous literature presented both the results of these efforts[14] and the methodology used to arrive at the optimum configuration.

The optimized nozzle-diffuser arrangement showed the nozzle clear from a standing shock wave and achieving good suction. The diffuser section's shock wave region (the region where Mach number drops sharply from supersonic to subsonic) lies at the throat of the diffuser or slightly downstream of it. The filing of patent applications for the above ejector configuration has occurred in both Canada and the US.[15 16]

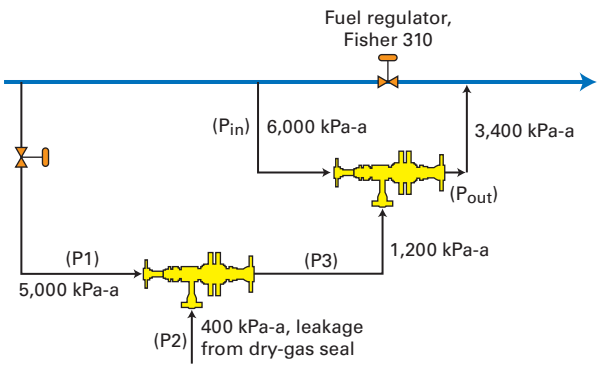
First stage

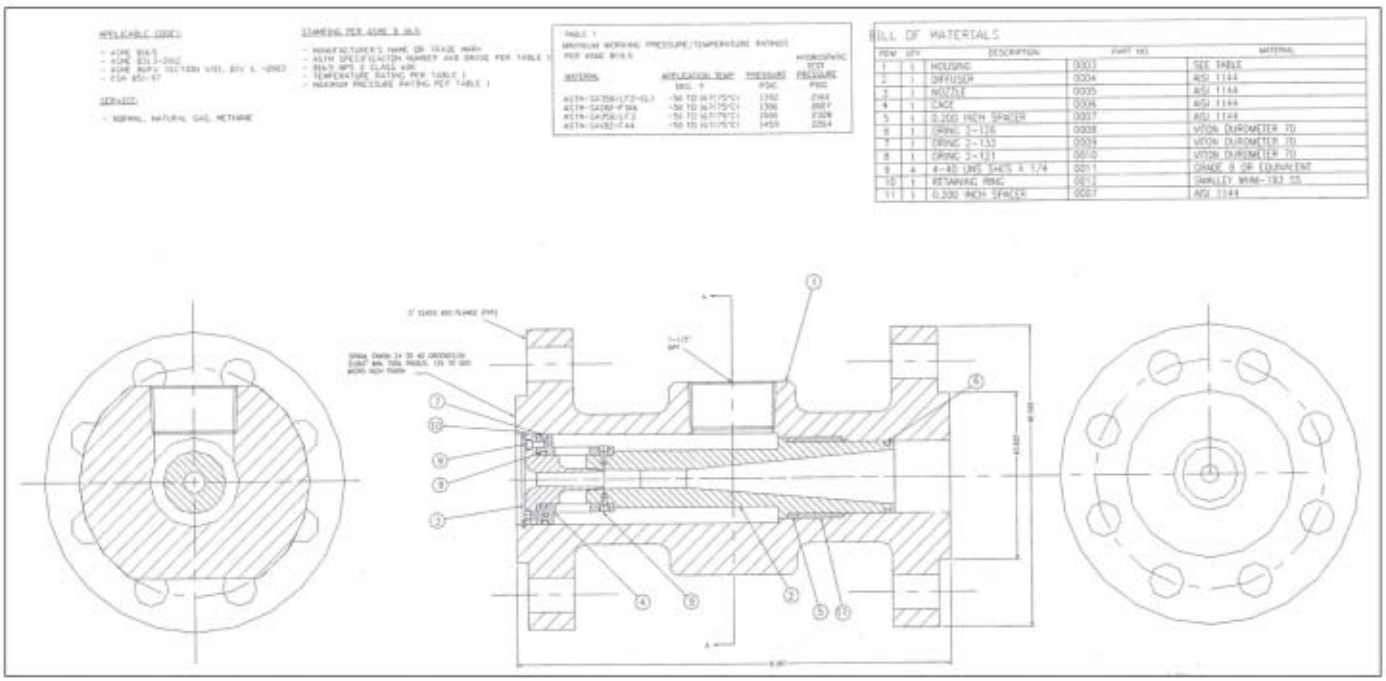
Satisfying the relatively low suction pressure to match the dry-gas seal leakage pressure (~400 kPa-a) in the context of this discussion requires an ejector with a highly supersonic exit flow, bringing with it the problem associated with compressing the same supersonic flow after entraining the dry-gas seal leakage gas in a supersonic diffuser. Fig. 2 shows the flexible prototype designed and fabricated in an attempt to reduce the likelihood of a shock wave at the throat of the supersonic diffuser.

This design not only allows various geometry supersonic nozzles to be tested with a fixed geometry diffuser, but also fine adjustments of the position of the nozzle exit in relation to the diffuser inlet (either positively, i.e., inserted into the diffuser inlet section, or negatively, i.e., retrieved back with a gap in between nozzle exit and diffuser inlet).

The supersonic diffuser has an inlet diameter of 4 mm, a throat diameter of 3.5 mm, a length of 8 mm, and an exit diameter of 18

TWO-STAGE EJECTOR DESIGN PRESSURES Fig. 5





Computational flow dynamic simulations optimized supersonic diffuser dimensions (throat, inlet, and outlet diameters and angles), positioning the nozzle with respect to the diffuser inlet and yielding this design for the best possible second stage (Fig. 6).

mm. Inlet ½-angle of the inlet section is 4.7°, with the exit section 5°.

Fabrication of several supersonic converging-diverging nozzles with different throat diameters and exit-throat area ratio, yielded a peak performance configuration of 1.6 mm (throat) × 2.8 mm (exit) nozzle placed 20.5 mm inside the supersonic diffuser. Figs. 3 and 4 show test results of the first-stage ejector with this nozzle size in terms of expansion ratio (P1:P2), compression ratio (P3:P2), and suction to motive gas flow ratio. Motive-gas pressure (P1 = 5,000 kPa-a) produced an expansion ratio of 20 and compression ratio of 3.5.

Second stage

The second-stage ejector's size and design allowed it to use full line gas pressure as motive gas without throttling and discharge at a pressure (P_{out}) up to 3,400 kPa-a (Fig. 5). The suction flow to the second stage is the exit flow from the first-stage ejector.

Numerical simulation using a one-dimensional gas dynamics model through the second-stage supersonic nozzle arrived at the nozzle area's ratio, from which a nozzle exit to throat area's ratio of 1.382 was selected as the nozzle's exit pressure matching the outlet pressure from the first-stage ejector.

CFD simulations then optimized supersonic diffuser dimensions (throat, inlet, and outlet diameters, as well as angles) and position of the nozzle with respect to diffuser inlet.

Fig. 6 shows the optimum design of the second stage.

Acknowledgment

The authors thank TransCanada for using the supersonic ejector on a compressor station in Alberta, Dwayne Krause for valuable assistance in designing the overall system, and both Vladimir Bakalchuk of John Crane and Sorin Necula of Dresser-Rand for valuable consultation during the initial phase of the implementation plan. This work is part of a research program sponsored by TransCanada PipeLines Ltd. ✦

References

1. Power, R.B., "Predicting Unstable-Mode Performance of a Steam Jet Ejector," Fluid Power Systems Technology, Collected Papers, ASME, 1994.

2. Freeman, B.Z., and Lior, N., "A Novel High-Temperature Ejector-Topping Power Cycle," Journal of Engineering for Gas Turbines and Power, Vol. 116, pp. 1-7, January 1994.

3. Minardi, J.E., "Compressible Flow Ejector Analysis with Application to Energy Conversion and Thrust Augmentation," AIAA 20th Aerospace Sciences Meeting, Orlando, Jan. 11-14, 1982.

4. Huang, B.J., and Chang, J.M., "Empirical Correlation for Ejector Design," International Journal of Refrigeration, Vol. 22, pp. 379-388, 1999.

5. Huang, B.J., Chang, J.M., Wang, J.M., and Petrenko, V.A., "A 1-D Analysis of Ejector Performance," International Journal of Refrigeration, Vol. 22, pp. 354-364, 1999.

6. Chen, S.L., Yen, J.Y., and Huang, M.C., "An Experimental investigation of ejector performance based upon different refrigerants," ASHRAE Transactions, Vol. 104, No. 2, pp. 153-160, June 1998.

7. Sun, Da-Wen, and Eames, I.W., "Recent Developments in the Design Theories and Applications of Ejectors—a Review," Journal of the Institute of

Energy, Vol. 68, No. 475, pp. 65-79, June 1995.

8. Villa, M., De Ghetto, G., Paone, F., Giacchetta, G., and Bevilacqua, M., "Ejectors for Boosting Low-Pressure Oil Wells," SPE Production and Facilities, Vol. 14, No. 4, pp. 229-234, November 1999.

9. Hu, H., Kobayashi, T., Saga, T., Taniguchi, N., Liu, H., and Wu, S., "Research on the Rectangular Lobed Exhaust Ejector-Mixer Systems," Transactions of the Japan Society for Aeronautical and Space Sciences, Vol. 41, No, 134, pp. 187-194, 1999.

10. Zahradnik, J., Fialova, M., Linek, V., Sinkule, J., Reznickova, J., and Kastanek, F., "Dispersion Efficiency of Ejector-type Gas Distributors in Different Operating Modes," Chemical Engineering Science, Vol. 52, No. 24, pp. 4499-4510, December 1997.

11. Fletcher, G.R., "Gas Jet Compressors," Petroleum Refiner, pp. 107-111, February 1954.

12. Botros, K.K., Geerligs, J., Imran, H., and Thompson, W., "Development of a Supersonic Ejector for Capturing Very Low Pressure Vent Gases and Reinjection into a High Pressure Stream," 6th International Pipeline Conference, Calgary, Alta., Sept. 25-29, 2006.

13. Shapiro, A.H., "The Dynamics and Thermodynamics of Compressible Fluid Flow—Vol. 1," E. Krieger Publishing Co., Malabar, Fla., pp. 972-973, 1983.

14. Zucrow, M.J. and Hoffman, J.P., Gas Dynamics, Vol. I, John Wiley & Sons Inc., 1976.

15. Botros, K.K., Geerligs, J., and Imran, H., "Tandem Supersonic Ejector," Canadian Patent Application, September 2006.

16. Botros, K.K., Geerligs, J., and Imran, H., "Tandem Supersonic Ejector," US Patent Application, May 2007.

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Equipment/Software/Literature

New compact power unit

Here's the newly redesigned KA power unit suited for machine tool, high pressure, and clamping applications.

It serves as a compact power supply that delivers operating pressures of as much as 10,000 psi.

It combines a pump, electric motor, and tank in one unit, offering minimal use of space and easy mobility. It has reservoir capacities as large as 2 gal—in using less fluid, this environmentally friendly solution creates less waste and requires less expense, the firm notes.

The modular KA is available with single and three-phase motors, in single or dual stage pump versions, and can work with an array of valves (directly mountable) and accessories. Vertical and horizontal installation is possible, and turnkey solutions and customized versions are available by request.

Source: **HAWE Hydraulik GMBH & Co. KG,** Streitfeldstrase 25, D-81673 Munich, Germany.

New frac characterization, modeling tool

FRACAFlow is a new fracture characterization and modeling tool.

Dynamic data are analyzed through specifiic modules (production, mud loss, permeability) to provide a fast diagnosis of the impact of fracturing on the fluid flow behavior of the reservoir. Fracture data at wells are also taken into account thanks to a global or well-by-well study.

Curvature analysis, fracture density log computation, or fault analysis in terms of length or throw for example are some of the tools that will help users to better understand reservoirs, the company points out.

The modeling step with the creation of discrete fracture network is enhanced with several conceptual models and can be generated on different zones of interest. There is a dedicated calibration module for automatically determining the model parameters for matching well test results.

The tool's analytical upscaling method allows the computation of equivalent parameters for fluid flow simulation.

Source: **Beicip-Franlab,** 232, Avenue Napoleon Bonaparte, Box 213, 92502 Rueil-Malmaison, France.

Services/Suppliers

Superior Energy Services Inc.,

Harvey, La., has announced that Patrick Zuber has been appointed executive vice-president, international sales. In addition, Charles Hardy has been named executive vice-president, marine services. Zuber, based in Dubai, has held various international business development positions at major oil field service companies during the past 12 years. He also has served in a range of management, business development, and engineering positions for both service and operating companies during a 25-year career. Hardy, employed with Superior since 2004, most recently served as vice-president and general manager, marine services. With more than 30 years of industry experience, Hardy has held various management and operations positions with a number of marine and oil field service companies.

Zuber

Hardy

Superior Energy Services Inc. serves the drilling-related needs of oil and gas companies mainly through its rental tools segment and the production-related needs of oil and gas companies through its well intervention, rental tools, and marine segments.

Knight,

Lafayette, La., has expanded with the opening of new facilities in Oklahoma City and Tulsa and has named an Oklahoma sales manager. The Oklahoma City facility is a full-service operation focused on oil field rental tools, drill pipe, and blowout preventer services, as well as equipment and inspection services for drill string operations and tubulars. It serves Oklahoma, the Texas Panhandle, and western Arkansas. Knight named as Oklahoma sales manager Boyd Deramus, who will be based in Oklahoma City. The company's Tulsa facility serves as a corporate office for facilitating relationships with customers in Tulsa and western Arkansas. Tulsa-based Rick Aikman has been named corporate sales representative and will handle all rental tools and fishing services accounts in Tulsa and western Arkansas. In addition to Aikman, Deramus's sales force includes Adam Romine, corporate sales representative focused on rental tools and fishing services, and Larry Hartman and Shawn Barnett, field sales representatives focused on rental tools.

Knight's operating companies include Knight Oil Tools, Knight Fishing Services, Knight Well Services, and Knight Manufacturing. The company is the largest privately owned rental tool firm in the oil and gas industry.

Imports of crude and products

	Districts 1-4		District 5		Total US		
	12-28 2007	12-21 2007	12-28 2007	12-21 2007	12-28 2007	12-21 2007	*12-29 2006
	1,000 b/d						
Total motor gasoline	1,140	993	11	22	1,151	1,015	1,254
Mo. gas. blending comp.	676	578	11	22	687	600	886
Distillate	326	145	—	—	326	145	385
Residual	259	269	—	—	259	269	95
Jet fuel-kerosine	114	105	21	48	135	153	249
Propane-propylene	199	122	17	13	216	135	196
Other	399	794	119	–9	518	785	–66
Total products	**3,113**	**3,006**	**179**	**96**	**3,292**	**3,102**	**2,999**
Total crude	**8,717**	**8,635**	**1,292**	**1,170**	**10,009**	**9,805**	**10,126**
Total imports	**11,830**	**11,641**	**1,471**	**1,266**	**13,301**	**12,907**	**13,125**

*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

	*1-4-08	*1-5-07	Change	Change, %
	$/bbl			
SPOT PRICES				
Product value	108.59	63.14	45.45	72.0
Brent crude	99.09	54.42	44.67	82.1
Crack spread	9.50	8.73	0.77	8.9
FUTURES MARKET PRICES				
One month				
Product value	108.92	64.35	44.57	69.3
Light sweet crude	98.17	56.74	41.43	73.0
Crack spread	10.75	7.61	3.14	41.3
Six month				
Product value	110.43	72.97	37.46	51.3
Light sweet crude	95.78	60.78	35.00	57.6
Crack spread	14.65	12.19	2.46	20.2

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

Purvin & Gertz LNG netbacks—Jan. 4, 2008

Receiving terminal	Liquefaction plant					
	Algeria	Malaysia	Nigeria	Austr. NW Shelf	Qatar	Trinidad
	$/MMbtu					
Barcelona	7.73	4.97	6.84	4.86	5.60	6.76
Everett	6.22	3.97	5.82	4.04	4.58	6.54
Isle of Grain	8.93	6.54	8.33	6.42	7.20	8.23
Lake Charles	5.10	3.01	4.85	3.20	3.50	5.78
Sodegaura	5.96	7.87	6.21	8.02	7.26	5.23
Zeebrugge	7.31	5.16	6.75	5.04	5.79	6.74

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		Jet fuel, kerosine	Fuel oils		Propane-propylene
		Total	Blending comp.[1]		Distillate	Residual	
	1,000 bbl						
PADD 1	11,689	54,746	27,177	8,854	50,727	14,628	4,329
PADD 2	61,260	49,347	16,444	7,792	29,238	1,218	19,655
PADD 3	148,313	65,361	30,271	12,269	31,092	17,225	27,428
PADD 4	13,820	6,381	1,909	603	3,125	567	[1]2,743
PADD 5	54,495	32,007	25,514	9,508	12,995	5,957	—
Dec. 28, 2007	**289,577**	**207,842**	**101,315**	**39,026**	**127,177**	**39,595**	**54,155**
Dec. 21, 2007	**293,633**	**205,857**	**100,162**	**39,245**	**126,608**	**40,991**	**56,061**
Dec. 29, 2006[2]	**329,676**	**209,532**	**93,356**	**39,065**	**135,563**	**42,413**	**61,885**

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

Refinery report—Dec. 28, 2007

District	Refinery operations		Refinery output				
	Gross inputs	Crude oil inputs	Total motor gasoline	Jet fuel, kerosine	Fuel oils		Propane-propylene
					Distillate	Residual	
	1,000 b/d						
PADD 1	1,438	1,438	1,667	84	487	119	67
PADD 2	3,311	3,280	2,219	201	1,038	47	212
PADD 3	7,543	7,428	3,451	726	2,103	293	758
PADD 4	520	516	275	30	141	19	[1]134
PADD 5	2,772	2,720	1,458	422	506	192	—
Dec. 28, 2007	**15,584**	**15,382**	**9,070**	**1,463**	**4,275**	**670**	**1,171**
Dec. 21, 2007	**15,359**	**15,218**	**9,004**	**1,452**	**4,294**	**742**	**1,145**
Dec. 29, 2006[2]	**15,832**	**15,529**	**9,326**	**1,532**	**4,311**	**663**	**1,158**
	17,436 operable capacity		**89.4% 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 1-2-08	Pump price* 1-2-08	Pump price 1-3-07
	¢/gal		
(Approx. prices for self-service unleaded gasoline)			
Atlanta	265.7	305.4	228.9
Baltimore	260.7	302.6	229.0
Boston	262.1	304.0	233.4
Buffalo	255.0	315.1	251.1
Miami	263.1	313.4	246.5
Newark	265.1	298.0	225.7
New York	242.9	303.0	244.8
Norfolk	266.7	304.3	222.1
Philadelphia	251.7	302.4	249.6
Pittsburgh	253.7	304.4	237.6
Wash., DC	263.6	302.0	236.3
PAD I avg.	259.1	305.0	236.8
Chicago	282.0	332.9	262.5
Cleveland	257.1	303.5	228.3
Des Moines	258.7	299.1	222.4
Detroit	253.0	302.2	225.4
Indianapolis	258.6	303.6	228.8
Kansas City	255.0	291.0	211.8
Louisville	262.5	299.4	225.4
Memphis	260.6	300.4	221.0
Milwaukee	249.9	301.2	232.6
Minn.-St. Paul	257.7	298.1	222.0
Oklahoma City	251.8	287.2	210.8
Omaha	255.5	301.9	224.8
St. Louis	263.4	299.4	218.8
Tulsa	248.4	283.8	210.7
Wichita	245.4	288.8	217.2
PAD II avg.	257.3	299.5	224.2
Albuquerque	263.7	300.1	218.7
Birmingham	254.1	292.8	222.4
Dallas-Fort Worth	249.1	287.5	225.1
Houston	250.0	288.4	220.1
Little Rock	253.6	293.8	221.2
New Orleans	261.9	300.3	221.8
San Antonio	249.7	288.1	219.0
PAD III avg.	254.6	293.0	221.3
Cheyenne	253.7	286.1	211.7
Denver	257.6	298.0	212.9
Salt Lake City	257.0	299.9	226.1
PAD IV avg.	256.1	294.7	216.9
Los Angeles	268.5	327.0	261.8
Phoenix	253.5	290.9	236.4
Portland	268.7	312.0	268.7
San Diego	276.5	335.0	269.5
San Francisco	291.5	350.0	283.0
Seattle	265.6	318.0	279.0
PAD V avg.	270.7	322.2	266.4
Week's avg.	**259.2**	**302.7**	**232.5**
Dec. avg.	**257.0**	**300.6**	**228.5**
Nov. avg.	**264.0**	**307.6**	**223.7**
2008 to date	**259.2**	**302.7**	—
2007 to date	**188.9**	**232.5**	—

*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

	12-28-07 ¢/gal		12-28-07 ¢/gal
Spot market product prices			
Motor gasoline (Conventional-regular)		Heating oil No. 2	
New York Harbor	247.25	New York Harbor	264.35
Gulf Coast	240.50	Gulf Coast	261.10
Los Angeles	256.10	Gas oil	
Amsterdam-Rotterdam-Antwerp (ARA)	240.50	ARA	268.98
Singapore	247.00	Singapore	264.29
Motor gasoline (Reformulated-regular)		Residual fuel oil	
New York Harbor	246.00	New York Harbor	179.83
Gulf Coast	238.75	Gulf Coast	175.60
Los Angeles	259.10	Los Angeles	197.88
		ARA	194.41
		Singapore	179.93

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

BAKER HUGHES RIG COUNT

	1-4-08	1-5-07
Alabama	4	7
Alaska	6	9
Arkansas	42	36
California	43	34
Land	41	31
Offshore	2	3
Colorado	99	95
Florida	0	0
Illinois	0	0
Indiana	1	0
Kansas	15	13
Kentucky	8	7
Louisiana	161	184
N. Land	57	54
S. Inland waters	27	20
S. Land	28	41
Offshore	49	69
Maryland	1	0
Michigan	1	2
Mississippi	11	20
Montana	10	22
Nebraska	0	0
New Mexico	70	92
New York	5	10
North Dakota	48	37
Ohio	11	11
Oklahoma	197	176
Pennsylvania	20	16
South Dakota	0	1
Texas	869	767
Offshore	12	11
Inland waters	2	2
Dist. 1	17	19
Dist. 2	36	25
Dist. 3	71	62
Dist. 4	92	93
Dist. 5	180	141
Dist. 6	110	127
Dist. 7B	37	32
Dist. 7C	56	41
Dist. 8	113	102
Dist. 8A	22	26
Dist. 9	52	31
Dist. 10	69	55
Utah	35	44
West Virginia	30	24
Wyoming	73	82
Others—NV-4; TN-6; VA-4	14	6
Total US	**1,774**	**1,695**
Total Canada	**319**	**417**
Grand total	**2,093**	**2,112**
Oil rigs	316	279
Gas rigs	1,450	1,411
Total offshore	63	85
Total cum. avg. YTD	**1,774**	**1,695**

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	Rig count	1-4-08 Percent footage*	Rig count	1-5-07 Percent footage*
0-2,500	54	1.8	43	2.3
2,501-5,000	104	50.0	108	53.7
5,001-7,500	216	24.0	221	20.8
7,501-10,000	423	1.8	425	3.2
10,001-12,500	422	3.7	407	2.4
12,501-15,000	275	—	257	—
15,001-17,500	117	—	118	0.8
17,501-20,000	67	—	79	—
20,001-over	32	—	39	—
Total	**1,710**	**7.5**	**1,697**	**7.6**
INLAND	35		32	
LAND	1,621		1,606	
OFFSHORE	54		59	

*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]1-4-08	[2]1-5-07
	1,000 b/d	
(Crude oil and lease condensate)		
Alabama	15	20
Alaska	660	784
California	648	680
Colorado	49	57
Florida	5	5
Illinois	28	27
Kansas	93	91
Louisiana	1,365	1,320
Michigan	15	14
Mississippi	48	48
Montana	94	99
New Mexico	173	164
North Dakota	108	114
Oklahoma	164	176
Texas	1,350	1,310
Utah	43	50
Wyoming	143	147
All others	60	69
Total	**5,061**	**5,175**

[1]OGJ estimate. [2]Revised.

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

US CRUDE PRICES

$/bbl*	1-4-08
Alaska-North Slope 27°	87.07
South Louisiana Sweet	101.25
California-Kern River 13°	85.25
Lost Hills 30°	93.90
Southwest Wyoming Sweet	89.41
East Texas Sweet	94.00
West Texas Sour 34°	87.50
West Texas Intermediate	94.50
Oklahoma Sweet	94.50
Texas Upper Gulf Coast	91.00
Michigan Sour	87.50
Kansas Common	93.50
North Dakota Sweet	89.75

*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]	12-28-07
United Kingdom-Brent 38°	93.25
Russia-Urals 32°	88.81
Saudi Light 34°	91.00
Dubai Fateh 32°	87.15
Algeria Saharan 44°	95.09
Nigeria-Bonny Light 37°	95.16
Indonesia-Minas 34°	95.84
Venezuela-Tia Juana Light 31°	90.87
Mexico-Isthmus 33°	90.76
OPEC basket	92.27
Total OPEC[2]	90.99
Total non-OPEC[2]	88.26
Total world[2]	89.76
US imports[3]	85.52

[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]

	12-28-07	12-21-07	12-28-06	Change, %
	bcf			
Producing region	922	938	943	–2.2
Consuming region east	1,604	1,657	1,745	–8.1
Consuming region west	395	413	393	0.5
Total US	**2,921**	**3,008**	**3,081**	**–5.2**
	Oct. 07	**Oct. 06**	**Change, %**	
Total US[2]	**3,567**	**3,452**	**3.3**	

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

Statistics

WORLDWIDE CRUDE OIL AND GAS PRODUCTION

	Oct. 2007	Sept. 2007	10 month average production 2007	10 month average production 2006	Change vs. previous year Volume	Change vs. previous year %	Oct. 2007	Sept. 2007	Cum. 2007
	Crude, 1,000 b/d						Gas, bcf		
Argentina	620	631	628	642	–13	–2.1	134.0	129.3	1,285.34
Bolivia	42	42	44	45	–1	–2.0	43.0	42.0	415.83
Brazil	1,687	1,726	1,746	1,711	34	2.0	30.0	30.0	286.60
Canada	2,742	2,588	2,630	2,483	147	5.9	481.3	472.5	4,937.05
Colombia	540	540	525	529	–3	–0.7	22.0	22.0	190.50
Ecuador	490	490	499	538	–39	–7.3	1.0	1.0	10.00
Mexico	2,995	3,161	3,114	3,293	–180	–5.5	196.9	183.1	1,829.94
Peru	115	114	113	115	–1	–1.2	9.4	9.0	75.69
Trinidad	120	120	122	147	–24	–16.6	120.0	120.0	1,159.87
United States	5,108	5,062	5,138	5,095	44	0.9	1,710.0	1,653.0	16,470.00
Venezuela[1]	2,410	2,380	2,391	2,576	–185	–7.2	75.0	70.0	722.00
Other Latin America	80	79	80	79	1	0.8	5.5	5.2	54.15
Western Hemisphere	**16,949**	**16,934**	**17,030**	**17,252**	**–223**	**–1.3**	**2,828.1**	**2,737.2**	**27,436.97**
Austria	17	17	17	17	—	–1.9	4.5	4.0	48.10
Denmark	310	308	312	333	–20	–6.1	29.2	26.0	237.67
France	20	20	19	21	–2	–9.5	3.3	3.2	30.46
Germany	65	67	68	70	–2	–2.2	51.6	44.7	499.48
Italy	104	109	108	110	–2	–1.6	29.0	28.0	287.80
Netherlands	34	35	40	24	16	65.8	160.0	150.0	2,095.00
Norway	2,273	2,190	2,273	2,492	–219	–8.8	296.6	233.1	2,581.34
Turkey	40	41	41	42	–1	–2.2	—	—	8.50
United Kingdom	1,644	1,405	1,519	1,516	3	0.2	219.5	178.1	2,168.20
Other Western Europe	4	5	4	5	—	–8.6	0.7	0.4	13.94
Western Europe	**4,512**	**4,195**	**4,402**	**4,629**	**–227**	**–4.9**	**794.4**	**667.5**	**7,970.49**
Azerbaijan	850	535	821	618	203	32.8	28.0	28.0	269.00
Croatia	16	15	16	17	–1	–5.1	6.3	5.7	60.83
Hungary	15	15	16	17	–1	–3.9	7.2	7.0	72.80
Kazakhstan	1,100	1,100	1,080	1,057	23	2.2	100.0	80.0	820.00
Romania	100	100	99	99	—	0.4	18.0	17.0	176.40
Russia	9,800	9,800	9,709	9,473	236	2.5	1,900.0	1,700.0	18,450.00
Other FSU	500	480	458	505	–47	–9.3	500.0	400.0	4,340.00
Other Eastern Europe	50	51	48	48	—	0.6	18.9	18.1	187.29
Eastern Europe and FSU	**12,431**	**12,096**	**12,246**	**11,833**	**414**	**3.5**	**2,578.5**	**2,255.8**	**24,376.31**
Algeria[1]	1,380	1,370	1,351	1,349	2	0.1	280.0	270.0	2,750.00
Angola[1]	1,803	1,718	1,676	1,393	283	20.3	5.0	4.0	31.90
Cameroon	85	85	84	88	–4	–4.2	—	—	—
Congo (former Zaire)	20	20	20	20	—	—	—	—	—
Congo (Brazzaville)	240	240	240	240	—	—	—	—	—
Egypt	630	630	639	672	–33	–4.9	42.0	40.0	410.60
Equatorial Guinea	320	320	320	320	—	—	0.1	0.1	0.60
Gabon	230	230	230	236	–6	–2.5	0.3	0.3	3.04
Libya[1]	1,720	1,720	1,700	1,704	–4	–0.2	23.0	22.0	220.90
Nigeria[1]	2,160	2,230	2,165	2,224	–59	–2.7	70.0	70.0	718.00
Sudan	480	480	471	410	61	14.9	0.0	0.0	0.00
Tunisia	91	81	97	65	31	47.7	6.4	6.2	65.23
Other Africa	232	232	232	240	–8	–3.2	10.2	9.7	99.72
Africa	**9,391**	**9,355**	**9,225**	**8,961**	**264**	**2.9**	**436.9**	**422.3**	**4,299.99**
Bahrain	170	170	172	172	—	–0.1	31.0	30.0	263.41
Iran[1]	4,000	3,920	3,924	3,886	38	1.0	250.0	240.0	2,485.00
Iraq[1]	2,300	2,180	2,037	1,919	118	6.1	5.0	5.0	49.00
Kuwait[1,2]	2,490	2,470	2,425	2,505	–80	–3.2	32.0	30.0	306.00
Oman	700	700	712	744	–32	–4.3	58.0	55.0	564.00
Qatar[1]	820	800	807	824	–17	–2.1	160.0	150.0	1,500.00
Saudi Arabia[1,2]	8,810	8,710	8,552	9,185	–633	–6.9	175.0	170.0	1,610.00
Syria	390	390	391	427	–36	–8.4	18.0	17.0	168.30
United Arab Emirates[1]	2,550	2,550	2,569	2,637	–68	–2.6	135.0	130.0	1,322.00
Yemen	330	330	341	347	–6	–1.7	—	—	—
Other Middle East	—	—	—	—	—	–34.9	8.6	9.7	87.11
Middle East	**22,560**	**22,220**	**21,930**	**22,645**	**–716**	**–3.2**	**872.6**	**836.7**	**8,354.81**
Australia	444	414	452	415	38	9.1	121.7	107.4	1,175.31
Brunei	180	185	180	204	–24	–11.8	35.0	35.6	348.16
China	3,732	3,726	3,752	3,692	60	1.6	212.8	204.6	2,012.59
India	708	685	685	678	8	1.1	88.8	83.5	819.16
Indonesia[1]	830	830	840	899	–59	–6.6	200.0	190.0	1,960.00
Japan	15	15	16	15	1	7.5	10.0	9.3	104.71
Malaysia	790	780	753	746	7	0.9	150.0	145.0	1,418.00
New Zealand	55	63	32	15	17	120.0	14.0	14.0	135.60
Pakistan	70	70	68	65	4	5.7	117.5	118.1	1,173.15
Papua New Guinea	50	50	50	49	1	2.0	0.5	0.5	4.95
Thailand	201	210	211	211	—	–0.1	47.0	45.0	436.00
Vietnam	300	300	312	347	–35	–10.0	13.0	12.0	128.50
Other Asia-Pacific	33	32	34	33	2	4.8	99.5	94.3	936.09
Asia-Pacific	**7,408**	**7,361**	**7,387**	**7,367**	**19**	**0.3**	**1,109.8**	**1,059.2**	**10,652.22**
TOTAL WORLD	**73,251**	**72,161**	**72,220**	**72,688**	**–468**	**–0.6**	**8,620.3**	**7,978.7**	**83,090.80**
OPEC	31,273	30,878	30,437	29,707	730	2.5	1,405.0	1,347.0	13,642.90
North Sea	4,244	3,925	4,124	4,356	–232	–5.3	593.2	481.9	5,612.77

[1]OPEC member. [2]Kuwait and Saudi Arabia production each include half of Neutral Zone. Totals may not add due to rounding.
Source: Oil & Gas Journal. Data available in OGJ Online Research Center.

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Candidates test limits of unruly energy utterance

On energy, US Democratic presidential hopefuls are testing the limits of unruly utterance.

For many months, Sen. Hillary Clinton of New York led what seems to be a contest in this area with her proposal to tax oil and gas so the government can spend $50 billion on alternative fuels (OGJ, Nov. 19, 2007, p. 17).

More recently, the two candidates who beat Clinton in the Iowa caucuses have been whipping her as well in energy demagoguery.

The Editor's Perspective

by Bob Tippee, Editor

When the crude oil futures price topped $100/bbl during trading in New York Jan. 2, John Edwards called the event "another example of how corporate greed is squeezing the middle class."

He said the increase "shows the urgency of taking on the big oil companies so we can build a new energy economy and transition away from oil to other affordable sources of energy," which he didn't identify.

Tracking to the central theme of his populist campaign, Edwards declared, "It's time for us to rise up and take on the corporate greed that is taking over our democracy so we can leave a better America to our children."

In Iowa, Edwards won second place behind Sen. Barack Obama of Illinois, who has his own strange energy voice.

"I'll be a president who harnesses the ingenuity of farmers and scientists and entrepreneurs to free this nation of the tyranny of oil once and for all," he said in his victory speech.

Apparently, Obama saw no contradiction between that promise and his assertion just moments earlier that "the time has come to tell the lobbyists who think their money and their influence speak louder than our voices that they don't own this government; we do, and we are here to take it back."

Let's connect the dots and fill in the missing word here: farmers, lobbyists, money...ethanol! No tyranny there, of course.

This is the candidate who wants the federal government to spend $150 billion over 10 years on "clean energy"—a sure way to run lobbyists out of town if ever there was one.

All for "our children," no doubt.

(Online Jan. 4, 2008; author's e-mail: bobt@ogjonline.com)

Market Journal

by Sam Fletcher, Senior Writer

Oil finally tops $100/bbl

For the first time ever, a front-month crude contract hit $100/bbl Jan. 2 before closing at $99.62/bbl, up $3.64 for the day in the initial trading session of 2008 on the New York Mercantile Exchange. The previous intraday high for front-month crude was $99.29/bbl Nov. 21.

The February contract climbed to $100.09/bbl Jan. 3 on NYMEX before slipping to a $99.18/bbl close. However, Olivier Jakob of Petromatrix GMBH, Zug, Switzerland, claimed the Jan. 3 record marked "the first real attempt to break the [$100/bbl] mythical level," since the Jan. 2 sale "was only a controversial one-lot transaction done on the floor away from computer trading." Jakob said, "The three-digit number provided strong resistance, but with a late buying wave maintaining the close within $1 of $100/bbl, we would expect to see further attempts at breaking it."

Jakob said, "Technically the positive momentum is still valid, and the risk remains for a strong advance when and if [a closing price of] $100/bbl is [achieved], as the next target will then jump to $105/bbl."

Jakob said, "While crude oil at $100/bbl makes a nice headline, the story is not about oil but about commodities. . . We expected a strong start of the year for commodities on the back of passive investment flows, and the tone of the first trading day of the year confirmed the trend. Pension funds will allocate more investment to commodities during the first quarter while reducing exposure to equities."

US inventories

The Energy Information Administration reported US crude stocks plunged 4 million bbl to 289.6 million bbl in the week ended Dec. 28, well below market expectations of a 1.7 million bbl drop. Gasoline inventories gained 1.9 million bbl to 207.8 million bbl in the same week. Distillate fuel inventories gained 600,000 bbl to 127.2 million bbl.

Although the latest data showed "another strong week for demand," it was not enough to offset rising supply, resulting in an increase in refined product inventories, said Jacques H. Rousseau at Back Bay Research LCC, a research partner for Soleil Securities Corp.

Analysts in the Houston offices of Raymond James & Associates Inc. said "mixed signals" on US stocks possibly contributed to a slight pullback in crude prices Jan. 3. "Also, tanker rates have skyrocketed out of the Middle East, indicating stronger production (i.e., more cheating)," among members of the Organization of Petroleum Exporting Countries, they said.

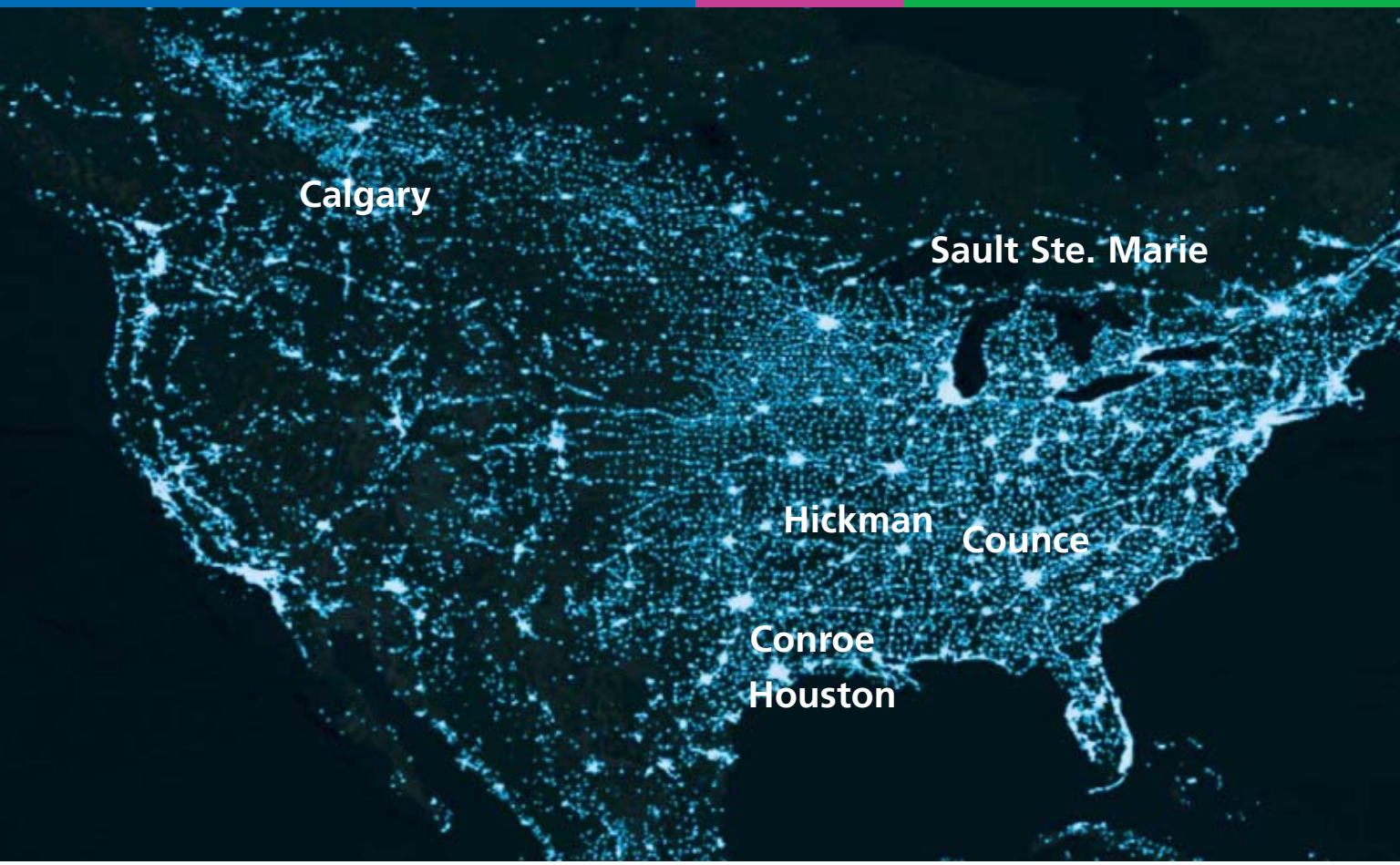
However, Jakob said, "The draw in crude oil stocks was expected due to the end-of-year tax savings. The crude stock change during January will be a better fundamental barometer since the December draws are only bullish if not met by a rebuild during January."

The final US weekly data for 2007 show US crude inventories ending the year some 65 million bbl lower than the peak at the end of June, said Paul Horsnell of Barclays Capital Inc., London. "The sharp down-trend in crude inventories has taken them from well above their 5-year average to 6.8 million bbl below that average. Allowing for crude oil held as pipeline fill, refinery and tank bottoms, (i.e., the minimum operating requirement), we estimate that the level of discretionary commercial US crude inventories has now fallen by about 60% over the past 6 months. What was a significant overhang is now a deficit relative to normal patterns," he said.

Raymond James analysts said, "Also putting upward pressure on crude prices is the worry that OPEC has minimal spare capacity. Shokri Ghanem, the chairman of Libya's National Oil Corp., recently stated, 'OPEC's production is already close to maximum capacity, and the organization can do nothing to curb prices.' However, Indonesia, the second-smallest OPEC producer, has announced its intention to request a 500,000 b/d production increase during OPEC's Feb. 1 meeting."

Jakob said, "OPEC is right to say that the price of oil is driven by financial flows rather than supply and demand, but they are wrong to say that they can not do anything about it. It would need either a much stronger US dollar or a wide contango to bring enough speculators back to the short side to offset the buying coming from pension funds. OPEC can not do much about the dollar, but it has the power do something about moving the current backwardation back to a contango. For that, OPEC would need the resolve to oversupply rather than supply, but it has not shown yet such intention." He said passive investment flows will not stay idle until OPEC's next meeting, "hence the risk remains on the upside."

(Online Jan. 7, 2008; author's e-mail: samf@ogjonline.com)



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Continuous Viscosity Profile Aids Production Facilities Design

Location: Campos Basin, Brazil

Client: Petrobras

Objectives:

- ✓ Characterize the reservoir to plan the field development
- ✓ Characterize the reservoir fluid to help design lifting and production facilities

Challenges:

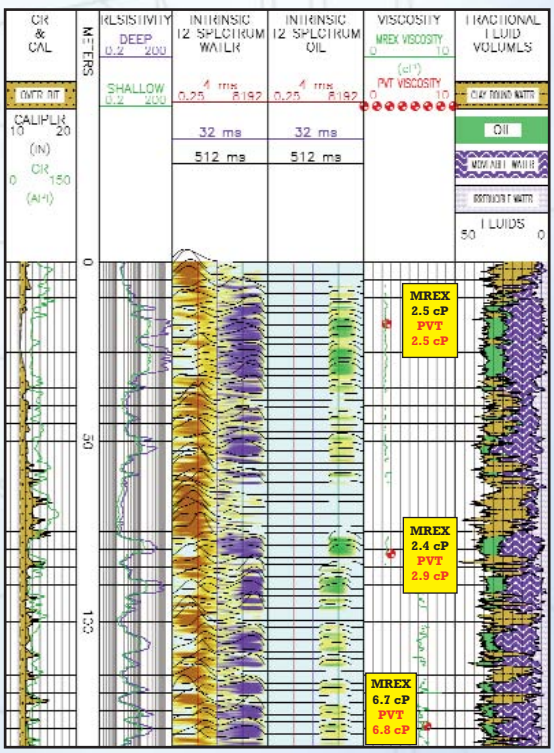
- ✓ Reservoir oil composition is expected to vary. 14 - 15° API oil is common, but 25° API also is found in offset wells.

Solution:

- ✓ The Baker Atlas MR Explorer℠ (MREX℠) service identified reservoir intervals with different oil properties.
- ✓ Baker Atlas' Reservoir Characterization Instrument® (RCI®) service collected six single-phase fluid samples in the identified intervals.

Results:

- ✓ Single-phase samples provided high-resolution PVT characterization of the reservoir fluid. Average contamination is less than 0.4%.
- ✓ The MREX analysis characterized in-situ oil viscosity as a continuous curve, matching measured viscosity within 5%.
- ✓ The PVT properties and in-situ viscosity profile helped client optimize production facilities.



Dual ESP Systems Increase Revenues $13.2 Million from Marginal Offshore Field

Location: Brazil

Problem:

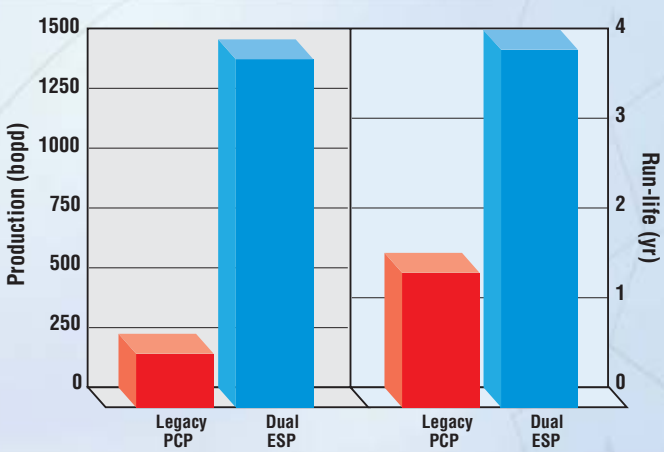
- ✓ Four wells experienced production declines, equipment failures with progressing cavity pump systems.
- ✓ Production fell from 754 bopd to 230 bopd.
- ✓ High operating cost

Solution:

- ✓ Centrilift replaced existing pumps with dual ESP systems
- ✓ Slim line profile designed for 7-in. casing

Results:

- ✓ Production increased 526% to 1440 bopd
- ✓ Runlife increased from 1.5 years to 4.0 years
- ✓ Added $13.2 million/year in revenue, based on $30/bbl oil
- ✓ Achieved payback in 10 months.



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