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The Iraqi oil dispute: Who holds the power?
Unexploited oil continues to attract technology innovations
Study examines production of near-zero sulfur FCC gasoline
North African gas provides ready European supply option

OIL&GAS JOURNAL®

Apr. 14, 2008
Volume 106.14

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This flare test marked one of Apache Corp. and Kuwait Foreign Petroleum Exploration Co.'s most recent discoveries in the Carnarvon basin on Australia's North West Shelf. The Brunello-1 well, 99 miles offshore, flowed 72.5 MMcfd of gas and 1,230 b/d of condensate from the Triassic Mungaroo formation. Exploration efforts in seven of the world's more remote basins are described in OGJ's Exploration and Development Frontiers special report starting on p. 39. Photo courtesy of Apache.

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PennWell, Houston office
1455 West Loop South, Suite 400, Houston, TX 77027
Telephone 713.621.9720/Fax 713.963.6285/Web site www.ogjonline.com
Editor Bob Tippee, bobt@ogjonline.com
Chief Editor-Exploration G. Alan Petzet, alanp@ogjonline.com
Chief Technology Editor-LNG/Gas Processing Warren R. True, warrent@ogjonline.com
Production Editor Guntis Moritis, guntism@ogjonline.com
Drilling Editor Nina M. Rach, ninar@ogjonline.com
Refining/Petrochemical Editor David N. Nakamura, davidn@ogjonline.com
Pipeline Editor Christopher E. Smith, chriss@ogjonline.com
Senior Editor-Economics Marilyn Radler, marilynr@ogjonline.com
Senior Editor Steven Poruban, stevenp@ogjonline.com
Senior Associate Editor Judy R. Clark, judyrc@ogjonline.com
Senior Writer Sam Fletcher, samf@ogjonline.com
Senior Staff Writer Paula Dittrick, paulad@ogjonline.com
Survey Editor Leena Koottungal, lkoottungal@ogjonline.com
Editorial Assistant Linda Barzar, lbarzar@pennwell.com

Petroleum Group President Michael Silber, msilber@pennwell.com
Vice-President/Group Publisher Bill Wageneck, billw@pennwell.com
Vice-President/Custom Publishing Roy Markum, roym@pennwell.com

PennWell, Tulsa office
1421 S. Sheridan Rd., Tulsa, OK 74112
PO Box 1260, Tulsa, OK 74101
Telephone 918.835.3161 / Fax 918.832.9290
Presentation/Equipment Editor Jim Stilwell, jims@ogjonline.com
Associate Presentation Editor Michelle Gourd, michelleg@pennwell.com
Statistics Editor Laura Bell, laurab@ogjonline.com
Illustrators Alana Herron, Kermit Mulkins, Mike Reeder, Kay Wayne
Editorial Assistant Donna Barnett, donnab@ogjonline.com
Production Director Charlie Cole

London
Tel +44 (0)208.880.0800
International Editor Uchenna Izundu, uchennai@pennwell.com

Washington
Tel 703.533.1552
Washington Editor Nick Snow, nicks@pennwell.com

Los Angeles
Tel 310.595.5657
Senior Correspondent Eric Watkins, hippalus@yahoo.com

OGJ News
Please submit press releases via e-mail to: news@ogjonline.com

Subscriber Service
P.O. Box 2002, Tulsa OK 74101
Tel 1.800.633.1656 / 918.831.9423 / Fax 918.831.9482
E-mail ogjsub@pennwell.com
Circulation Manager Tommie Grigg, tommieg@pennwell.com

PennWell Corporate Headquarters
1421 S. Sheridan Rd., Tulsa, OK 74112
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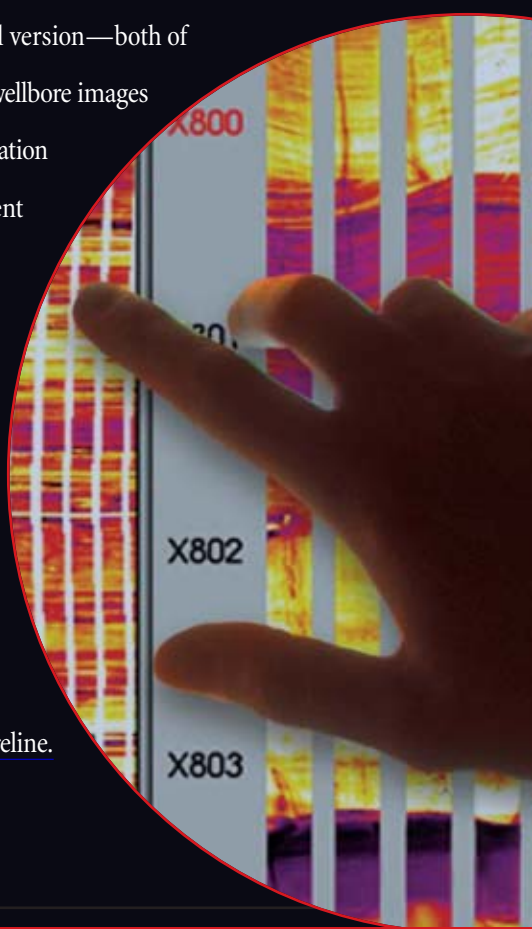

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Apr. 14, 2008

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General Interest — Quick Takes

APPEA: Australia underweight in share of LNG

Australia has been called "underweight" in its share of the LNG supply market, given the size of the country's gas resources, according to the Edinburgh-based UK consultants Wood Mackenzie Ltd.

Speaking at Australian Petroleum Production & Exploration Association's annual conference in Perth, Ben Hollins, WoodMac's head of European gas and power, said the pace of development of new LNG projects in Australia has been too slow because it is hindered by rising costs, disunity among joint venture partners, and obstacles to environmental approvals.

For example, Hollins pointed out that a jump in construction costs has delayed the Chevron Corp.-led Gorgon project.

Currently Australia has just two producing projects having a combined capacity of 15.2 million tonnes/year, and yet APPEA has set a target of up to 60 million tonnes/year of LNG production by 2017.

Hollins said that target looks increasingly unlikely to be met. WoodMac estimates Pacific Basin demand for LNG could jump 83% to 203 million tonnes by 2020, which is up from 111 million tonnes produced this year.

Hollins said there are at least 12 rival projects being proposed in Australia, and LNG buyers in Asia are frustrated at the slow rate of development. The buyers are also confused as to which projects might succeed.

"This creates a headache for them," he said "and that's not good for Australian interests either."

Chevron's Wheatstone Project and Shell's radical floating LNG proposal for Prelude field in the Browse basin are recent examples of the scramble by gas owners to get their projects to the starting line to take advantage of the forecast boom in global demand for LNG.

Hollins believes the Australian government needs to play a part in ensuring that developments do proceed.

Seven arrested in rocket attacks in Sanaa, Yemen

The Al Qaeda terrorist organization, building on earlier claims, has taken responsibility for a rocket attack on a residential complex in Yemen that houses executives and the headquarters of Safer E&P Operations Co.

"Al Qaeda has issued a statement claiming the attack," said a Yemeni security official. Residents reported no injuries after three rockets struck near the residences of US employees of the Yemen-owned Safer Oil Co.

The official said police had arrested seven people in connection with the attack, adding that three people had fired the rockets from a car on the edge of the complex of villas in the al Hadda district in southwestern Sanaa, the Yemeni capital.

The attack occurred 2 days after the arrest in Sanaa of Al Qaeda operative, Abdullah al Rimi, who was sought by the US Federal Bureau of Investigation. Al Rimi has been identified as taking part in attacks in Riyadh, Saudi Arabia, in 2003 and on the USS Cole in 2000 in the Yemeni port of Aden, which killed 17 US sailors and injured many others.

Suspected Al Qaeda militants have claimed several attacks in Yemen, the ancestral homeland of the terror network's chief Osama bin Laden.

Recently, the Jund al Yemen Brigades, an Al Qaeda affiliate group, claimed responsibility for two operations carried out in Hadhramaut, including a Mar. 27 bomb attack on a pipeline belonging to Total SA in the Sah Valley and a Mar. 29 mortar attack on an unidentified Chinese oil company operating in Al-Khish'a.

Since the attacks on the USS Cole in 2000, several other foreign interests, specifically oil interests, have been attacked, according to the Yemen report by the US Energy Information Administration.

These include:

- The suicide bombing of the Limburg French oil tanker off the coast of Yemen, killing one and causing a massive fire and leakage of 150,000 bbl of oil into the Gulf of Aden (OGJ Online, Oct. 11, 2002).
- An unsuccessful firing of a surface-to-air missile at an oil company helicopter in 2002.
- The 2006 foiled suicide bomb attempt against two oil facilities.
- The more-recent attacks on oil company personnel near the border between the Marib and Shabwa governorates.

Colombia shortlists 20 firms for heavy oil projects

Colombia's National Hydrocarbons Agency (ANH) has invited 20 companies to submit formal proposals in May to develop eight greenfield heavy-oil blocks in the East Llanos basin, the head of the agency told OGJ.

Companies that made the shortlist include ExxonMobil Corp., Royal Dutch Shell PLC, Nexen Inc., and OAO Lukoil. In an exclusive interview, Armando Zamora, director general, said ANH hopes to sign technical evaluation agreements with the winners by July.

"We have invited those with the financial muscle and expertise to do the work," Zamora said. "We want companies that can engage in high risk exploration." The successful companies will have a large area in which to gather data and drill stratigraphic wells, he added. They will then choose a limited area within the technical evaluation agreement (TEA) area. "We will sign a limited number of exploration contracts, depending on the size of the area," Zamora said. "The rest of the block will be open to outside competition."

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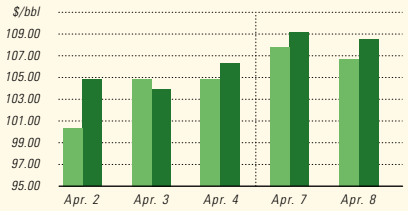
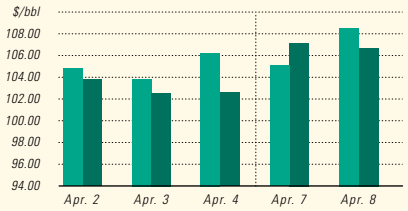
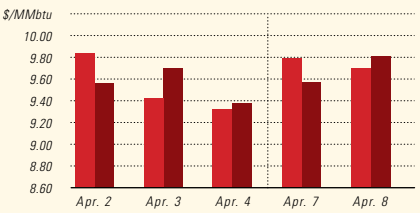


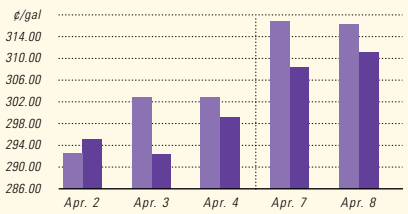
WTI CUSHING / BRENT SPOT



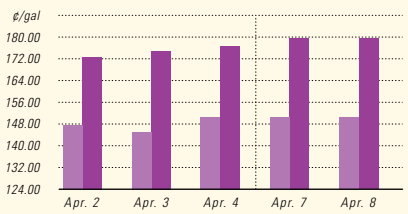
NYMEX NATURAL GAS / SPOT GAS - HENRY HUB



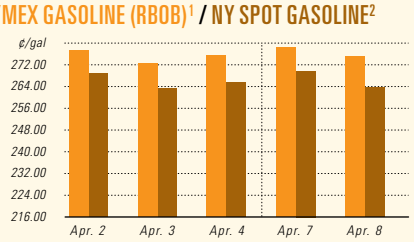
IPE GAS OIL / NYMEX HEATING OIL



PROPANE - MT. BELVIEU / BUTANE - MT. BELVIEU



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



[1]Reformulated gasoline blendstock for oxygen blending.
[2]Non-oxygenated regular unleaded.

US INDUSTRY SCOREBOARD — 4/14

Latest week 3/28	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	9,162	9,164	—	9,088	9,028	0.7
Distillate	4,205	4,338	–3.1	4,275	4,399	–2.8
Jet fuel	1,613	1,556	3.7	1,571	1,602	–1.9
Residual	612	769	–20.4	677	820	–17.4
Other products	4,691	4,729	–0.8	4,938	4,938	—
TOTAL DEMAND	20,283	20,556	–1.3	20,549	20,786	–1.1
Supply, 1,000 b/d						
Crude production	5,098	5,177	–1.5	5,052	5,174	–2.3
NGL production[2]	2,471	2,425	1.9	2,521	2,303	9.5
Crude imports	9,799	10,285	–4.7	9,950	9,890	0.6
Product imports	3,214	3,531	–9.0	3,375	3,373	—
Other supply[3]	972	679	43.2	963	909	5.9
TOTAL SUPPLY	21,554	22,097	–2.5	21,860	21,649	1.0
Refining, 1,000 b/d						
Crude runs to stills	14,671	15,338	–4.4	14,671	14,757	–0.6
Input to crude stills	14,844	15,194	–2.3	14,844	15,123	–1.8
% utilization	85.1	87.0	—	85.1	86.6	—

Latest week 3/28	Latest week	Previous week[1]	Change	Same week year ago[1]	Change	Change, %
Stocks, 1,000 bbl						
Crude oil	319,164	311,847	7,317	332,721	–13,557	–4.1
Motor gasoline	224,710	229,235	–4,525	205,201	19,509	9.5
Distillate	109,720	111,349	–1,629	117,952	–8,232	–7.0
Jet fuel-kerosine	38,067	38,006	61	40,082	–2,015	–5.0
Residual	39,736	38,638	1,098	38,560	1,176	3.0
Stock cover (days)[4]			Change, %		Change, %	
Crude	22.2	21.5	3.3	22.5	–1.3	
Motor gasoline	24.5	25.2	–2.8	22.1	10.9	
Distillate	26.1	26.3	–0.8	26.8	–2.6	
Propane	18.1	17.5	3.4	18.5	–2.2	
Futures prices[5] **4/4**			**Change**		**Change**	**%**
Light sweet crude, $/bbl	103.49	104.24	–0.75	64.73	38.76	59.9
Natural gas, $/MMbtu	9.68	9.54	0.14	7.53	2.15	28.5

[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

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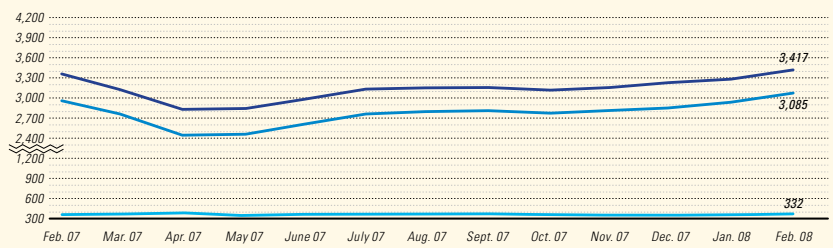
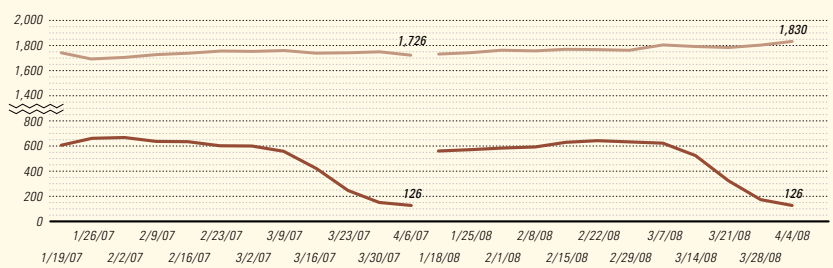


Note: Monthly average count

BAKER HUGHES RIG COUNT: US / CANADA



Note: End of week average count

Zamora anticipates that the ANH will select four to eight companies to work on the eight blocks, and they will have 3 years to perform TEA work.

According to a study carried out by Halliburton, the blocks hold an estimated 120 billion bbl of original resources in place. Heavy oil development is a major component of ANH's strategy to help Colombia increase its reserves to 4 billion boe by 2020.

Colombia separately is offering 17 heavy oil blocks under its international bidding round to potential operators to sign exploration contracts by October (OGJ Online, Apr. 2, 2008). ✦

Exploration & Development — *Quick Takes*

BP makes oil discovery on Kodiak prospect in gulf

BP Exploration & Production Inc. has made an oil find at its Kodiak prospect on Mississippi Canyon Block 771 in the deepwater Gulf of Mexico about 60 miles southeast of Louisiana.

The Kodiak discovery well was drilled to a total depth of 31,150 ft in 5,000 ft of water. BP reported the well hit 500 net ft of hydrocarbon-bearing sands in Middle and Lower Miocene reservoirs. The well was drilled using Transocean's Deepwater Horizon semisubmersible drilling rig.

The well was deviated with a horizontal step-out of 7,400 ft. BP said further appraisal is needed to determine the size and commerciality of the find.

The Kodiak discovery well lies in the vicinity of BP's 2003 Tubular Bells discovery, the company said. The lease was acquired at federal OCS Lease Sale 182 in March 2002.

BP operates the well with a 63.75% stake. Its partners are Eni SPA 25% and Marubeni Oil & Gas (USA) Inc. 11.25%.

Husky wins North Amethyst development nod

Husky Energy Inc. has received approval for subsea development of North Amethyst oil field, the first of three White Rose field satellites planned for development off Newfoundland (OGJ, Feb. 25, 2008, p. 37).

After completing agreements on royalties and benefits with federal and provincial governments, Husky let a €190 million contract to Technip for engineering, fabrication, and installation of 23.7 km of flexible flowlines and 5.4 km of umbilicals plus installation of manifolds and associated pipework.

Technip's Deep Pioneer and Wellservicer vessels will install the equipment in 2009.

Husky expects to drill 11 North Amethyst wells for tie-back to the SeaRose floating production, storage, and offloading vessel moored in 120 m of water in White Rose field. Base-case production estimate for the satellite is 62,900-75,500 b/d.

Last year Husky said White Rose, in the Jeanne d'Arc basin 350 km east of St. John's, Newf., was producing an annual average 120,000-125,000 b/d of 30° gravity oil. It trimmed output to 90,000-95,000 b/d in January while performing maintenance on the FPSO and halted production during Apr. 1-3 because of an ice threat.

Apache logs Australian gas discovery

Houston independent Apache Corp. logged 195 ft of net pay across five intervals of the Triassic Mungaroo Sandstone in the Julimar Southeast-1 discovery on Australia's North West Shelf.

Apache has drilled five gas discoveries on License WA-356-P, including Julimar-1, Julimar East-1, Brunello-1, and Brulimar-1.

The latest discovery, which was not tested, was drilled in 502 ft of water about 1.9 miles from Julimar-1, which logged 132 ft of net pay and test-flowed a combined 85 MMcfd of gas from two zones.

"Julimar Southeast-1 encountered both the stratigraphically oldest and structurally deepest gas pay in the field to date," said G. Steven Farris, Apache president and chief executive officer. "Two additional wells are planned on the block in 2008, and we believe the ultimate size of this gas accumulation could be in the range of 2-4 tcf," he said.

Apache owns a 65% interest in the block, with Kuwait Foreign Petroleum Exploration Co. holding the remainder.

Apache said the Halyard-1 discovery test-flowed at a peak rate of 68 MMcfd of gas and 936 b/d of condensate from 91 ft of net gas pay in the Cretaceous Halyard sandstone.

The Halyard-1 was drilled in 366 ft of water in Permit WA-13-L, the same production license as Apache-operated East Spar field. Apache owns 55% interest in the block; Santos Ltd. owns the remaining interest. The discovery is on a trend with Apache-operated John Brookes field, which is producing 240 MMcfd of gas from three wells.

That test was on 54 ft of perforations in two intervals beginning at a measured depth of 8,525 ft. It was constrained by the capacity of surface equipment.

"Halyard-1 is our first test of a series of recently identified stratigraphic traps along the front edge of the Barrow Delta," Farris said. "The production test confirms the presence of high-quality reservoir sandstones and their capacity to deliver gas at commercial rates. Apache has identified several other undrilled geologic features with similar geophysical characteristics in the same area."

The company said production from Halyard could be brought to Western Australia's gas market via an existing Apache-operated pipeline 10 miles south of the discovery and through the Varanus Island processing and transportation hub. This proximity to existing transportation facilities is likely to reduce the time and expense required to develop the project.

Pioneer developing Raton Pierre shale gas

A shale gas play on the Colorado side of the Raton basin has recovery potential exceeding 2 tcf of gas net to Pioneer Natural Resources Co. from about 21 tcf in place on its acreage, the Dallas company said.

The play covers 134,000 acres of the 318,000 acres the company has leased in the basin, all of which is held by coalbed methane production. Planned Raton basin drilling of 175 wells in 2008 will include 15 Pierre shale wells.

Pioneer said five wells are producing 2 MMcfd of gas from one of five prospective zones in Cretaceous Pierre laminated shale, and five more wells are in early stages of completion and production

to test play boundaries. Gross thickness of the Pierre, a Mancos equivalent, is 2,200-2,800 ft at 4,000-6,000 ft. The lowermost interval is 200-400 net ft thick.

The company, which identified the play 18 months ago, said it has 1,200 risk-adjusted potential drilling locations based on 80-acre spacing. Wells will be drilled from new and existing pads, and gas will be produced through the CBM facilities.

Pioneer expects its Pierre proved reserves to reach 70 bcf by the end of 2008 and more than 200 bcf by the end of 2010. It recorded 18 bcf of proved reserves as of Dec. 31, 2007.

The first two vertical Pierre shale discovery wells have been producing from the lowest interval only for 16 and 10 months, respectively. The next two shallower intervals have been identified as productive.

Pioneer plans to assess the potential upside from horizontal drilling, which is under way, and the potential to produce from the shallowest two shale intervals.

The company expects to average $1 million/well plus $200,000 per frac interval for an average finding and development cost of $10-15/boe and to average a before-tax internal return rate of 40% at $8/Mcf.

"Pierre shale activity is expected to accelerate in 2009, supporting a compounded average annual production growth rate from the Raton basin of 10-15%," Pioneer said. ✦

Drilling & Production — *Quick Takes*

COSL to enter onshore drilling market

China Oilfield Services Ltd. (COSL) plans to enter the onshore drilling market this year for the first time.

COSL Chief Executive Officer Yuan Guangyu said the firm has decided to focus on the onshore market as a primary area of business expansion and as a main driver of financial growth.

This year COSL will deploy five drilling rigs in PetroChina's Changqing oil field in Shaanxi province, where it will provide drilling services for 3 years at a rate of $15,000-20,000/day.

COSL last year won a $100 million contract to supply an unnamed Libyan drilling company with four onshore rigs for 3 years, starting last month, each drilling to 5,000-7,000 m.

COSL has signed a preliminary agreement to provide onshore drilling in Myanmar, and is in talks to provide services to shallow water oil and gas project operators in the Gulf of Mexico, where it already has built four rigs for Mexico's Petroleos Mexicanos, Yuan said.

Petrobras leases five deepwater rigs for $4 billion

Petroleo Brasileiro SA (Petrobras) has signed a memorandum of understanding with Noble Corp. to lease five deepwater rigs over a period of 29 rig years at a potential cost of $4 billion. The contracts are subject to the approval of Petrobras's top management.

Petrobras currently is employing the two semis and three drillships off Brazil.

Noble said the new contracts could increase its total backlog to more than $10 billion. The deal includes performance bonuses, a 1-year option on the Noble Paul Wolff, and paid shipyard time during upgrades for three dynamically positioned drillships.

The deal would include:

• The Noble Paul Wolff dynamically positioned semisubmersible for a 5-year primary term beginning in November 2009, with a 1-year option. The fourth generation semi can drill in 9,200 ft of water. With an 18% performance bonus, the total cost is $1.08 billion.

• The Noble Roger Eason drillship rated to drill in 7,200 ft of water. Contract is for 6 years, beginning in March 2010. The lease will cost $888 million, including a 15% performance bonus.

• The Noble Leo Segerius drillship, rated to drill in 5,600 ft of water, for a 6-year term, beginning in the second or third quarter of 2009. Cost to Petrobras is $769 million, including a 15% performance bonus.

• The Noble Muravlenko drillship for 6 years beginning in March 2009. The drillship can drill in 4,900 ft of water. Its lease will cost $744 million, including a 15% performance bonus.

• The Noble Therald Martin conventionally moored semisubmersible that can drill in 3,900 ft of water. It will lease for a 5-year term beginning in October 2010. Cost of the lease is $542 million, including a 10% performance bonus.

Noble will proceed with planned upgrades on each of the three drillships. The upgrades will cost about $175 million/ship and will take each rig out of service for about 150 days. Petrobras will pay about $90,000/day for up to 150 days for each rig's scheduled shipyard stay.

StatoilHydro awards 5-year drilling contract

StatoilHydro awarded Aker Drilling ASA a 5 billion kroner contract for 5-year drilling operations in the Norwegian Sea.

StatoilHydro awarded the contract last December but had yet to finalize its duration beyond a minimum of 3 years.

Aker Drilling's Aker Spitsbergen sixth-generation newbuild rig will work at Halten Nordland in the Norwegian Sea where deep water and harsh weather are great challenges on the Norwegian continental shelf. "The construction of the rig is now in full progress at the Aker Kvaerner yard at Stord," Aker Drilling said. Aker Spitsbergen is slated for delivery by July. ✦

Processing — *Quick Takes*

Sasol proposes Project Mafutha CTL plant

Sasol Technology (Pty.) Ltd. has hired Foster Wheeler South Africa (Pty.) Ltd. to carry out a prefeasibility study for the Project Mafutha coal-to-liquids (CTL) plant in South Africa. The contract value was not disclosed.

Project Mafutha, a greenfield CTL facility, would produce 80,000 b/d of synthetic fuel using Sasol's proprietary low and high temperature Fischer-Tropsch processes and refinery technology for converting the Fischer-Tropsch products into fuel products. Foster Wheeler will investigate a location for the plant.

"The project will also include other processing units, utilities and offsite facilities necessary to support the development," a Foster Wheeler spokesperson said. "Foster Wheeler's scope for the study will also include the integration of other venture elements, such as the mining operation, into the overall venture scope."

ACS: Preparation key to HDS catalyst

Oxford Catalysts announced Apr. 9 at the American Chemical Society Meeting, New Orleans, that a new approach to catalyst preparation could provide major improvements in the performance of hydrodesulfurization (HDS) catalysts.

According to Tiancun Xiao, cofounder of Oxford Catalysts, experiments suggest that the preparation method, rather than the type or combination of metals, has the greatest influence on HDS catalyst performance.

Oxford Catalysts' experiments reveal that monometallic, bimetallic, and trimetallic HDS catalysts prepared using organic matrix combustion perform better than HDS catalysts of similar compositions prepared using impregnation methods.

"This result was a surprise," said Sergio Gonzalez-Cortes, research scientist for Oxford Catalysts. "We don't yet understand why this happens, but we think that it may be due to the strong interaction between cobalt and nickel." ✦

Transportation — *Quick Takes*

Shell mulls $2.1 billion floating LNG project

Shell Australia is considering a $2.1 billion (Aus.) floating LNG facility at its Prelude gas field in the Browse basin off Western Australia.

The company believes the time has come for development of relatively small gas fields—those having reserves of less than 5 tcf of gas—using the radical floating facility approach as opposed to the conventional fixed platform with pipeline to shore.

For the Prelude discovery, which lies about 450 km north of Broome on the Kimberley coast of Western Australia, a pipeline to shore could cost more than $3 billion.

The Shell find, made last year in the permit adjacent to Inpex's Ichthys field, was once thought to be an extension of the Ichthys structure.

Speaking Apr. 7 at the Australian Petroleum Production & Exploration Association Conference in Perth, Royal Dutch Shell PLC's Linda Cook, executive director of gas and power, denied that allegation, saying Prelude is a separate structure with a reserve of about 2-3 tcf. This is the type of project that would suit a floating LNG development.

Such a project would avoid the environmental sensitivities of bringing gas ashore on the pristine Kimberley coast where competing projects have prompted the Western Australian and federal governments to research a single gas production hub to reduce the environmental impact on the region.

Cook said it was still early in the proposal's evaluation, but Shell believes the floating LNG technology has potential in both Australia and Asia.

Shell has lodged an environmental review application with the Australian government for the Prelude project, which it says could be in production by 2012.

The company says it expects to issue a tender for the building of the first of its floating LNG vessels in the third quarter.

Sempra to send more Costa Azul LNG gas to US

Sempra Energy, San Diego, has completed expansion of its 140-mile Baja North pipeline, enabling it to carry natural gas from its Energia Costa Azul LNG regasification terminal in Baja California, Mexico, to additional markets across the US border in California and Arizona.

The expansion is expected to be in operation later in the second quarter, Liparidis said.

Sempra Pipeline & Storage Chief Executive Officer George Liparidis, speaking at an analysts' conference, said the $250 million expansion included a 45-mile, 42-in. spur along with compression upgrades and looping along the existing 30-in. mainline.

Gasoducto Bajanorte SRL operates the pipeline, which originates at an interconnection with North Baja Pipeline LLC west of Algodones and continues west through the cities of Mexicali and Tecate, Mexico.

The existing mainline, which has a capacity of 500 MMcfd of gas, serves new and existing power plants and industrial customers in northern Baja California and Southern California.

Liparidis said Sempra soon will have access to another extension as well—the Yuma lateral—to transport gas from the terminal to gas-fired power plants operated by major Arizona utilities in the Yuma, Ariz., area.

Construction on the lateral is under way, and completion is expected in early 2009.

Chinese-built LNG carrier for NWS delivered

The North West Shelf Joint Venture partners have taken delivery of the first of three Chinese-built LNG carriers that will transport LNG from the Burrup Peninsula plant to Dapeng receiving terminal in Guandong Province, China.

The Dapeng Sun carrier was delivered at Hudong-Zhonghua shipyard in Shnaghai by Yue Peng LNG Shipping.

The second vessel, Dapeng Moon, will be completed during the third quarter. Each of the JV companies has 5% equity in Yue Peng LNG.

The NWS group's 25-year supply deal with the Guangdong consortium buyer was signed in 2002 for 3.3 million tonnes/year of LNG to Dapeng on a fob basis, and the agreement became effective in December 2004.

Separately, in another NWS project, Woodside Petroleum Ltd. awarded a $200 million (Aus.) contract to a JV of Australian engineering group Clough Ltd., Perth, and Interbeton, the Netherlands, to construct the LNG jetty for the Pluto LNG project on the Burrup Peninsula.

The 300 m-long jetty will be completed by yearend 2009. ✦

Letters

A disquieting look

A look at what's happening to world crude oil production is disquieting. For example:

- The only country in the world with additional producing capacity is Saudi Arabia. However, the capacity of that country to increase its oil production meaningfully and to sustain it over the longer term must be viewed in the context of what appears to be faltering production in its aging "crown jewels," including Ghawar, Abqaiq, and Safaniya that were discovered over 50 years ago.
- Domestic petroleum consumption in Iran is increasing as its crude oil production begins to falter.
- Given oil project lead times and the present turmoil, prospects for significantly increasing production in Iraq over prewar levels are poor. Iraq's giant oil fields, Kirkuk and Rumalia, are 80 and 50 years old respectively and are showing their age.
- North Sea and Norwegian offshore production is declining.
- Oil production in Mexico, an important US supplier, is declining alarmingly—down 174,000 b/d or 5.3% in 2007.
- Political unrest in Venezuela and Nigeria does not bode well for dependable, stable oil supplies from those regions.
- It's becoming increasingly rare that a major new oil field is discovered.
- Oil producers continue to do what they can to stem the decline of existing fields, estimated at 4.5%/year by Cambridge Energy Research Associates.

Meanwhile, world crude oil demand continues to rise. Clearly, the era of cheap oil is over, and this will moderate the growth in demand. Still, the assessment of John B. Hess, chairman and chief executive of Hess Corp., appears spot on. "Given the long lead times of at least 5-10 years from discovery to production, an oil crisis is coming and sooner than most people think. Unfortunately, we are behaving in ways that we do not know there is a serious problem (OGJ, Feb. 25, 2008, p. 27)."

Even in the unlikely event that Mr. Hess is dead wrong and there turns out to be oil aplenty (albeit costly) for

years to come, there is still no reason to squander a resource that is finite and depleting. The US as the world's profligate energy consumer should take the lead in energy conservation and efficient energy utilization, in developing alternative energy sources, and in showing others how to do it. Therein lie immense market opportunities.

Thomas Wyman
Palo Alto, Calif.

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

APRIL

CERI World Oil Conference, Calgary, Alta., (403) 220-2380, (403) 289-2344 (fax), e-mail: jstaple@ceri.ca, website: www.ceri.ca. 13-15.

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.

Base Oils & Lubricants in Russia and the CIS Conference, Moscow, +44 207 067 1800, +44 207 430 0552 (fax), e-mail: e.polovinkina@theenergyexchange.co.uk, website: www.wraconferences.com/Overview.html. 16-17.

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.ogwaexpo.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.

Oil and Gas Pipelines in the Middle East Conference, Abu Dhabi, +44 (0) 1242 529 090, e-mail: c.pallen@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk/mepipes8/mepipes8register.html. 12-14.

GPA Houston Midstream Conference, Houston, (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@gasprocessors.com, website: www.gasprocessors.com. 13-14.

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 &

Calendar

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.

The CIS Oil and Gas Summit, Paris, +44 (0) 207 067 1800, +44 207 430 0552 (fax), e-mail: l.hannant@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk/summit8/summit8register.html. 28-30.

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.

SPEE Society of Petroleum Evaluation Engineers Annual Meeting, Hot Springs, Va., (713) 651-1639, (713) 951-9659 (fax), e-mail: bkspee@aol.com, website: www.spee.org. 7-10

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.

Asian Oil, Gas & Petrochemical Engineering Exhibition, Kuala Lumpur, +44 (0)20 7840 2100, +44 (0)20 7840 2111 (fax), e-mail: oga@oesallworld.com, website: www.allworldexhibitions.com. 10-12.

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.

Asia's Subsea Conference & Exhibition, Kuala Lumpur, +44 (0)20 7840 2100, +44 (0)20 7840 2111 (fax), e-mail: subsea@oesallworld.com, website: www.subseaasia.org. 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.

IPAA Midyear Meeting, Colorado Springs, Colo., (202) 857-4722, (202) 857-4799 (fax), website: www.ipaa.org. 19-21.

PIRA Scenario Planning Conference, Houston, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 23.

API Tanker Conference, San Diego, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 23-24.

API Exploration & Production Standards on Oilfield Equipment & Materials Conference, Calgary, Alta., (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 23-27.

PIRA Understanding Global Oil Markets Conference, Houston, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 24-25.

Russian Petroleum & Gas Congress, Moscow, +44 207 596 5016, e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 24-26.

NEFTEGAZ Exhibition, Moscow, +44 207 596 5016, e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 24-26.

PIRA's Globalization of Gas Study Conference, Houston, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 25.

PIRA Understanding Natural Gas Markets Conference, Houston, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 26-27.

World Petroleum Congress, Madrid, +34 91 745 3008, +34 91 563 8496 (fax), e-mail: info@19wpc.com, website: www.19wpc.com. June 29- July 3.

JULY

International Offshore & Polar Engineering Conference, Vancouver, (650) 254 2038, (650) 254 1871 (fax), e-mail: meetings@isope.org, website: www.isope.org. 6-11.

Annual Rocky Mountain Natural Gas Strategy Conference & Investment Forum, Denver, (303) 861-0362, (303) 861-0373 (fax), e-mail: conference@coga.org, website: www.coga.org. 9-11.

IADC Lifting & Mechanical Handling Conference & Exhibition, Houston, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 15-16.

Oil Sands and Heavy Oil Technology Conference & Exhibition, Calgary, Alta., (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.oilsandstechnologies.com. 15-17.

AUGUST

ACS National Meeting & Exposition, Philadelphia, 1 (800) 227-5558, e-mail: natlmtgs@acs.org, website: www.acs.org. 17-21.

IADC/SPE Asia Pacific Drilling Technology Conference, Jakarta, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 25-28.

Offshore Northern Seas Exhibition & Conference, Stavanger, +47 51 59 81 00, +47 51 55 10 15 (fax), e-mail: info@ons.no, website: www.ons.no. 26-29.

Summer NAPE Expo, Houston, (817) 306-7171, (817) 847-7703 (fax), e-mail: info@napeexpo.com, website: www.napeonline.com. 27-28.

SEPTEMBER

China Power, Oil & Gas Conference & Exhibition, Guangzhou, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.chinasenergyfuture.com. 2-4.

ECMOR XI-European Mathematics of Oil Recovery Conference, Bergen, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 8-11.

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

Rocky Mountain GPA Annual Meeting, Denver, (918) 493-3872, (918) 493-3875 (fax), email: pmirkin@gasprocessors.com, website: www.gasprocessors.com. 10.

API Fall Refining & Equipment Standards Meeting, Los Angeles, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 15-17.

Rio Oil & Gas Conference & Expo, Rio de Janeiro, 55 21 2112 9078, 55 21

Calendar

2220 1596 (fax), e-mail: riooil2008@ibp.org.br, website: www.riooilegas.com.br. 15-18.

API/NPRA Fall Operating Practices Symposium, Los Angeles, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 16.

GEO India South Asia's Geosciences Conference & Exhibition, New Delhi, +44 (0)20 7840 2100, +44 (0)20 7840 2111 (fax), e-mail: geo@oesallworld.com, website: www.geo-india.com. 17-19.

SPE Annual Technical Conference & Exhibition, Denver, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 21-24.

ERTC Petrochemical Conference, Cannes, +44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. Sept. 29-Oct. 1.

International Pipeline Exposition, Calgary, Alta., 403) 209-3555, (403) 245-8649 (fax), website: www.petroleumshow.com. Sept. 30-Oct. 2.

Unconventional Gas International Conference & Exhibition, Ft. Worth, Tex., (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.unconventionalgas.net. Sept. 30-Oct. 2.

OCTOBER

NPRA Q&A Forum, Orlando, Fla., (202) 457-0480, (202) 457-0486 (fax), e-mail: info@npra.org, website: www.npra.org. 5-8.

GPA Houston Annual Meeting, Kingwood, Tex., (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@gasprocessors.com, website: www.gasprocessor.com. 7.

KIOGE Kazakhstan International Oil & Gas Exhibition & Conference, Almaty, + (44) 020 7596 5000, + (44) 020 7596 5111 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 7-10.

IADC Drilling West Africa Conference & Exhibition, Lisbon, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 8-9.

International Gas Union Research Conference, Paris, +31 50 521 30 78, +31 50 521 19 46 (fax), e-mail: igrc2008@gasunie.nl, website: www.igrc2008.com. 8-10.

ERTC Lubes and Additives Conference, Berlin, +44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. 13-15.

Middle East Plant Maintenance Conference, Abu Dhabi, +44 207 067 1800, +44 207 430 0552 (fax), e-mail: d.michalski@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk. 13-15.

API Fall Petroleum Measurement Standards Meeting, Long Beach, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 13-17.

Central and Eastern European Refining & Petrochemicals Roundtable, Warsaw, +44 207 067 1800, +44 207 430 0552 (fax), e-mail: c.taylor@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk. 14-16.

ISA EXPO, Houston, (919) 549-8411, (919) 549-8288 (fax) website: www.isa.org. 14-16.

Oil & Gas Transportation in the CIS & Caspian Region Conference, Moscow, +44 (0) 207 067 1800, +44 207 430 0552 (fax), e-mail: j.golodnikova@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk/cispipes10register.html. 14-16.

PIRA New York Annual Conference, New York, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 16-17.

Petchem Arabia Conference, Abu Dhabi, +44 207 067 1800, +44 207 430 0552 (fax), e-mail: c.verma@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk. 20-22.

SPE Asia Pacific Oil & Gas Conference & Exhibition, Perth, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 20-22.

SPE International Thermal Operations & Heavy Oil Symposium, Calgary, Alta., (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 20-23.

Permian Basin International Oil Show, Odessa, Tex., (432) 367-1112, (432) 367-1113 (fax), e-mail: pbioilshow@pbioilshow.org, website: www.pbioilshow.org. 21-23.

AAPG International Conference & Exhibition, Cape Town, (918) 560-2679, (918) 560-2684 (fax), e-mail: convene@aapg.org, website: www.aapg.org. 26-29.

Biofuels Conference, Berlin, +44 207 067 1800, +44 207 430 0552 (fax), e-mail: c.taylor@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk. 28-30.

SPE Russian Oil & Gas Technical Conference & Exhibition, Moscow, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 28-30.

Arab Oil & Gas Show, Dubai, +971 4 3355001, +971 4 3355141 (fax), e-mail: info@icedxb.com, website: www.ogsonline.com. 28-30.

IADC Contracts & Risk Management Conference, Houston, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 29-30.

NOVEMBER

ASME International Mechanical Congress & Exposition, Boston, (973) 882-1170, (973) 882-1717 (fax), e-mail: infocentral@asme.org, website: www.asme.org. 2-6.

Abu Dhabi International Petroleum Exhibition & Conference (ADIPEC), Abu Dhabi, website: www.adipec.com. 3-6.

Deepwater Operations Conference & Exhibition, Galveston, Tex., (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.deepwateroperations.com. 4-6.

North African Oil and Gas Summit, Vienna, +44 (0) 207 067 1800, +44 207 430 0552 (fax), e-mail: c.brown@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk/nas3register.html. 4-6.

Mangystau International Oil & Gas Exhibition, Aktau, + (44) 020 7596 5000, + (44) 020 7596 5111 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 5-7.

GPA North Texas Annual Meeting, Dallas, (918) 493-3872, (918) 493-3875 (fax), email: pmirkin@gasprocessors.com, website: www.gasprocessors.com. 6.

IADC Annual Meeting, Paradise Valley, Ariz., (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 6-7.

SEG International Exposition and Annual Meeting, Las Vegas, (918) 497-5542, (918) 497-5558 (fax), e-mail: register@seg.org, website: www.seg.org. 9-14.

IPAA Annual Meeting, Houston, (202) 857-4722, (202) 857-4799 (fax), website: www.ipaa.org. 10-12.

Houston Energy Financial Forum, Houston, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.accessanalyst.net. 11-13.

American Institute of Chemical Engineers (AIChE) Annual Meeting, Philadelphia, (212) 591-8100, (212) 591-8888 (fax), website: www.aiche.org. 16-21.

ERTC Annual Meeting, Vienna, +44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. 17-19.

IADC Well Control Middle East Conference & Exhibition, Muscat, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 24-25.

Annual European Autumn Gas Conference (EAGC), Cernobbio, Italy, +44 (0) 1737 855281, +44 (0) 1737 855482 (fax), e-mail: vanessahurrell@dmgworldmedia.com, website: www.theeagc.com. 25-26.

DECEMBER

Annual Refining & Petrochemicals in Russia and the CIS Countries Roundtable, Prague, +44 207 067 1800, +44 207 430 0552 (fax), e-mail: e.polovinkina@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk. 2-4.

Downstream Asia Refining & Petrochemicals Conference, Singapore, +44 (0) 207 067 1800, +44 207 430 0552 (fax), e-mail: a.ward@theenergyexchange.co.uk, website: www.wraconferences.com/FS1/dalregister.html. 3-4.

IADC Drilling Gulf of Mexico Conference & Exhibition, Galveston, Tex., (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 3-4.

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PIRA Natural Gas Markets Conference, New York, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 8-9.

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Seatrade Middle East Maritime Conference & Exhibition, Dubai, +44 1206 545121, +44 1206 545190 (fax), e-mail: events@seatrade-global.com, website: www.seatrade-middleeast.com. 14-16.

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.

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

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

2009

JANUARY

Oil & Gas Maintenance Technology Conference & Exhibition, Manama, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.oilandgasmaintenance.com. 19-21.

Pipeline Rehabilitation & Maintenance Conference & Exhibition, Manama, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.piipeline-rehab.com. 19-21.

SPE Hydraulic Fracturing Technology Conference, The Woodlands, Tex., (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 19-21.

FEBRUARY

ASEG International Conference & Exhibition, Adelaide, +61 8 8352 7099, +61 8 8352 7088 (fax), e-mail: ASEG2009@sapro.com.au. 22-26.

MARCH

GPA Annual Convention, San Antonio, (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@gasprocessors.com, website: www.gasprocessors.com. 8-11.

Middle East Oil & Gas Show & Conference (MEOS), Manama, +973 17 550033, +973 17 553288 (fax), e-mail: aeminfo@batelco.com.bh, website: www.allworldexhibitions.com/oil. 15-18.

Asian Biofuels Roundtable, Kuala Lumpur, +44 (0) 207 067 1800, +44 207 430 0552 (fax), e-mail: a.ward@theenergyexchange.co.uk, website: www.wraconferences.com/FS1/AB1register.html. 24-25.

MAY

ACHEMA International Exhibition Congress, Frankfurt, +1 5 168690220, +1 5 168690325 (fax), e-mail: amorris77@optonline.net, website: http://achemaworldwide.dechema.de. 11-15.

Gastech International Conference & Exhibition, Abu Dhabi, +44 (0) 1737 855000, +44 (0) 1737 855482 (fax), website: www.gastech.co.uk. 25-28.

JUNE

Oil and Gas Asia Exhibition (OGA), Kuala Lumpur, +60 (0) 3 4041 0311, +60 (0) 3 4043 7241 (fax), e-mail: oga@oesallworld.com, website: www.allworldexhibitions.com/oil. 10-12.

OCTOBER

International Oil & Gas Exploration, Production & Refining Exhibition, Jakarta, +44 (0)20 7840 2100, +44 (0)20 7840 2111 (fax), e-mail: ogti@oesallworld.com, website: www.allworldexhibitions.com. 14-17.

Journally Speaking

Seismic in reserves reporting

Alan Petzet
Chief Editor-Exploration

Industry comments on US federal reserves reporting rules indicate that oil and gas companies believe seismic data could play important roles.

The Securities and Exchange Commission asked for comments about modernizing its 1978 reserves reporting rules, and some in the industry believe the commission plans to update the procedures.

In the 30 years since the SEC established its rules, the industry has made dramatic advances in seismic surveying and imaging, many of which have been chronicled in this magazine.

Indeed, 3D seismic surveying technology, invented by ExxonMobil Corp. predecessor Humble Oil & Refining Co. in 1963, was hardly available to the wider industry by the time the SEC placed its existing rules in effect in 1978.

The extent to which companies believe seismic information could improve reserves reporting is evident in comments filed with the SEC. The comments reflect many other changes companies believe the commission should make, and full comments are posted on the SEC web site.

The existing SEC rules allow public companies to report only proved reserves and then under relatively narrow definitions of what constitutes "proved."

Seismic contributions

Confining disclosure to proved reserves, narrowly defined, serves SEC's goal of reducing the chance that investors will be misled. But some companies favor the reporting of probable reserves as providing a more complete view of a company's holdings.

The comments indicate that some companies don't feel that the SEC rules are flexible enough to allow them to give an accurate picture of the variances between conventional oil and gas reserves, enhanced oil recovery project reserves, unconventional gas accumulations, and oil sands reserves.

Devon Energy Corp. commented: "Reserves should be determined using proven, modern technology that is in general use in the petroleum extractive industries. Permitted technologies should include 3D seismic for structural interpretation as well as reservoir limits, where definitive; history-matched reservoir simulation to calculate original hydrocarbons-in-place and recoveries; use of modern pressure gauges in wireline formation testers; and other methods when proven to be reliable through repeated application.

"Any such technology should be proven through actual field and reservoir performance before reserves associated with such technology would be allowed in financial reports."

BP PLC said, "If pressure-and-fluid and seismic data that have been shown to be good indicators of contact depth in appropriate analogs are available, and the evaluator can demonstrate reasonable certainty of their estimate, then that information should be used."

Other seismic potential

Some companies commented on the uses of seismic in unconventional gas reservoirs.

Ultra Petroleum Corp. said: "The current staff interpretation that (proved undeveloped) locations must be immediately adjacent to producing units and their interpretation that certainty means absolute certainty for utilization of newer technologies such as 3D seismic for PUD locations more than one offset away is outdated and not consistent with how companies make drilling decisions.

"For our major asset (Pinedale field, Wyo.) we have used our 3D interpretation for the past 7 years drilling a mixture of PUD, probable, possible, and even unengineered locations with 100% success in obtaining commercial wells. In addition, the current interpretation is very difficult to apply to this same field, which has four different well drilling densities with areas approved for 40, 20, 10, and 5 acre development."

Ultra asked, "If PUD locations are booked as direct offsets to a 40 acre drilled producing well and the area is down-spaced to 10 acres drilling, do we lose PUD locations? Has the certainty been decreased for the other three locations in the booked 40 acre area?"

Southwestern Energy Co. said its experience in the Fayetteville shale indicates that microseismic data from multistage hydraulic fracs can help demonstrate the productivity along the length of a horizontal lateral as long as the data show a consistent pattern that the stimulations treated the entire lateral length.

The next steps

The SEC at some point will file a proposal for new rules.

The commission will allow a 60-day comment period, then review the comments and publish final rules followed by another 60-day comment period.

After that, the commissioners will vote on whether to adopt the final regulations.

Whatever the outcome, oil and gas companies may soon see the fruits of some 30 years of major technological advances begin to be reflected in their reserves reporting. ✦

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Editorial

Truckers and diesel prices

A late-March protest by US truckers fizzled. Hoping to call attention to crushing increases in diesel prices, independent truckers at the end of March drove slowly to disrupt traffic in several areas and talked about a strike. For the most part, traffic and business proceeded normally. And the national average diesel price loitered just below $4/gal. Do beleaguered truckers know diesel doesn't have to be this pricey yet may become even more so?

Crude prices above $100/bbl largely explain recent spurts in prices of diesel and other oil products, of course. But they don't explain why diesel has come to sell at a stout premium to gasoline most of the time instead of the discount that once was more common. The new diesel-gasoline price relationship reflects increases in the cost of making diesel and in demand for the fuel—increases aggravated by governmental excess.

Sulfur cuts

The US government at the end of 2000 had good reason to lower the sulfur content of diesel fuel, beginning in 2006. Sulfur fouls the exhaust-treatment equipment that new diesel vehicles must have to lower emissions of compounds associated with ozone and particle pollution. Whether the Environmental Protection Agency had good reason to cut sulfur as much as it did, however, deserves question.

Because trade associations challenged the mandate in an unsuccessful lawsuit, the oil industry receives criticism for having resisted cuts in diesel's sulfur content. In fact, the industry supported a reduction to 50 ppm sulfur by weight from the 500 ppm limit that had prevailed for highway diesel since 1993. EPA insisted on the 15 ppm limit.

The industry argued that the difference in environmental performance between 15 ppm and 50 ppm sulfur in diesel was negligible. EPA disagreed. The industry also pointed out that the difference between costs of meeting the standards was huge. Sulfur is especially hard to remove from diesel, and the last traces of the material are the hardest of all. Refiners could have met a 50 ppm sulfur limit mostly with processing changes. The lower limit required more new or retrofitted equipment and much greater investment. Making 15 ppm sulfur diesel requires greater inputs of hydrogen and more crude per barrel of product than would have been required by the 50 ppm alternative. According to industry estimates made before EPA issued its rule, setting the limit at 15 ppm instead of 50 ppm at least doubled the cost of the 2000 sulfur cut. EPA mandated the costlier option anyway.

Now, therefore, highway vehicles burn a fuel that's much more sophisticated and expensive to make than what they used before mid-2006. It's a fuel with physical limits on supply because of the costly equipment needed for its manufacture and the relatively low volumes available in international trade. And, if industry groups were right about an environmental position they were willing to defend in court as they unsuccessfully challenged EPA's jurisdiction, it's a fuel more costly and less plentiful than it should be.

More strains are in prospect. The requirement for ultralow-sulfur diesel will expand to off-road uses in the next few years, and exemptions for small refiners will expire. Meanwhile, the requirement for ethanol in gasoline is boosting demand for diesel because ethanol and its ingredients must move about in trucks and rail cars. This new call on diesel supply will grow as the ethanol mandate expands and when the ultralow-sulfur requirement extends to railroad transport in 2012.

Price effects?

There's no way to isolate the price effects of all this, especially with crude oil prices setting records. But reversal of diesel's price relationship against gasoline, which has undergone costly changes of its own, indicates the extent of the transformation and associated loading of cost.

Diesel consumers can't say they received no warning about the cost effects of a regulation challenged before its imposition as unnecessarily aggressive. They can only pay up and hope crude prices recede. The next time dead-sure regulators want to change fuel chemistry, though, they should remember the lesson and demand assurance that benefits warrant the cost. ✦

The Iraqi oil dispute: Who holds the power?

Justin Dargin
International Institute of Ideas (Interintel)
Stockholm

The new Iraqi National Constitution left as many petroleum questions unanswered as it answered. It not only separated branches of government but also established federalism as its lodestar. Due to unresolved legal issues covering regional and national control over petroleum resources, oil companies continue to function in a hazy legal environment.

The legal context

The Iraqi constitution, negotiated in 2005 and approved by a nationwide referendum on Oct. 15, 2005, assumed the force of law in 2006.

To move from Iraq's Baathist past, the framers of the new constitution established among its fundamental principles that Iraq is a "single, federal, independent, and fully sovereign state."[1] And within that federation, the Northern Kurdistan Region has special recognition.[2] The rush to approve a national constitution left widespread uncertainty as to the division of power between the regions and the federal government on matters related to energy policy.

The Kurdish Regional Government (KRG) argues that Article 112 of the Iraqi constitution grants the central government a conditional right to "undertake management of oil and gas extracted from existing oil and gas fields." In homage to federalism, this right is shared with the producing governorates and regional governments.

Article 112 does not, however, grant the central government the power to manage nonproducing, underproducing, or future fields. These fields are under the control of the regional governments, which must, somehow, respect overall federal policy in oil development.

Further, the KRG argues that Article 110 of the Iraqi constitution enshrines the KRG's legal right to oil self-determination and limits the federal government's powers to such activities as providing national security and mail service and printing currency.

While these conflicting, if not mutually exclusive, constitutional provisions optimally embody compromise and the wish to expedite a constitution palatable to all stakeholders, they may set the stage for wholesale political conflict or even violence in an already shattered country.

After simmering for years, tension boiled over in late November 2007 when the Iraqi Oil Ministry proclaimed that it will unilaterally cancel KRG contracts with oil companies signed after February 2007. The threat of cancellation shows that the central government treats regional contracts seriously.

Facts of the dispute

In fourth-quarter 2007, the KRG increased the tempo of its oil deals and signed four contracts that will attract an estimated $500 million in investment.[3] The agreements, announced on Nov. 7, 2007, show that the KRG is interested in weighty contracts with large oil and gas companies. A subsidiary of MOL Hungarian Oil & Gas PLC signed two production-sharing contracts, while India's largest private oil company Reliance Energy and Austria's OMV signed two additional production-sharing contracts.[3]

In addition, the KRG awarded four "strategic" blocks to Kurdistan Exploration & Production Co. and granted the undeveloped Khurmala oil field to Kurdistan National Oil Co.

These deals followed five oil and gas production-sharing contracts signed in early 2007.[3] In total, the KRG has either opened or has pending 28 production contracts and production-sharing agreements (PSAs).[3]

Most of the KRG contracts are with smaller, more risk-taking firms because larger international oil companies fear censure from the central government if they participate with the KRG's contract initiatives. Holders of the PSAs will take 15% of the profit, with the remaining 85% to be divided between Baghdad and the KRG.

However, even these small oil and gas deals drew the ire of the country's

oil ministry, which in September stated that the deals are illegal and do not have the proper legal force to go forward.[4]

The KRG rejects this claim and stated that it not only has the legal authority but also will continue its current talks with a number of local and international oil and gas companies.[4]

The KRG signed a PSA with a subsidiary of Toronto's Heritage Oil for drilling in the Miran block and authorized another with the French oil and gas company Perenco for the Sindi-Amedi block. Frustrated by the Iraqi parliament's slow passage of the nationwide draft oil and gas law, the KRG sought to increase its own production from several hundred thousand barrels per day to 1 million b/d in about 5 years.[4]

The KRG oil and gas council also has set its sights on enhancing the region's refining capacity. In 2007, the KRG approved construction of two 20,000 b/d refineries valued at a total of $300 million. Heritage Oil will construct one in the vicinity of the Miran block area, while Addax Petroleum and Turkish partner Genel Enerji will build another in the Taq Taq oil field area.

The issue of Kirkuk is central in the eyes of the KRG and is a point of contention between the federal authorities and the KRG. The Kirkuk region, which sets atop a field holding 15 billion bbl of Iraq's estimated 115 billion bbl, falls outside of the Kurdish-administered area. A referendum will determine whether Kirkuk, and its surrounding provinces of Diyala and Ninawa, will become part of the Kurdistan region.[4]

Article 140 of the constitution initially recognized that the Kirkuk referendum would be held by Dec. 31, 2007. However, persistent delays and allegations of ethnic cleansing have held it back for a further 6 months.[5] Control of this oil-rich governorate is a major source of friction between the KRG and Baghdad.

Baghdad reacts

Baghdad is obviously unhappy with the contracts signed between the KRG and the oil companies. In October 2007, Iraqi Oil Minister Hussain al-Shahristani stated, "[There] are many measures the federal government is thinking of taking against these companies, and one of them is to blacklist them and prevent them from working in Iraq in the future."[6] He ratcheted up the pressure on Nov. 24, 2007, by proclaiming the deals "null and void."[6]

In order to counter the KRG law, and in the absence of a national oil law, he threatened to utilize Saddam-era legislation to block these deals.[7] "[The] federal government's position toward these new deals is that any contract signed without its approval isn't considered a contract," he said.[7]

The KRG responded to the oil minister's threatened use of Saddam-era laws by stating that most of Saddam's laws are null and void because they conflict with the new constitution.[8]

To add teeth to its pronouncements, federal officials declared that any contracts signed without the approval of the central authorities would be considered "smuggling."[8] Al-Shahristani contended that, under Hussein-era hydrocarbon law and the current Iraqi draft law, the state oil marketing body is the only organization authorized to export Iraqi oil. Hence exportation by any other means is "smuggling."[9]

The central authorities set out the parameters by forbidding oil companies from purchasing Iraqi oil or bidding on upcoming projects in Iraq's oil and gas sector if they've signed any deals with the KRG since February 2007. This date is significant as the benchmark when Baghdad and the KRG reached a temporary compromise; however, it fell apart a few months later.[10]

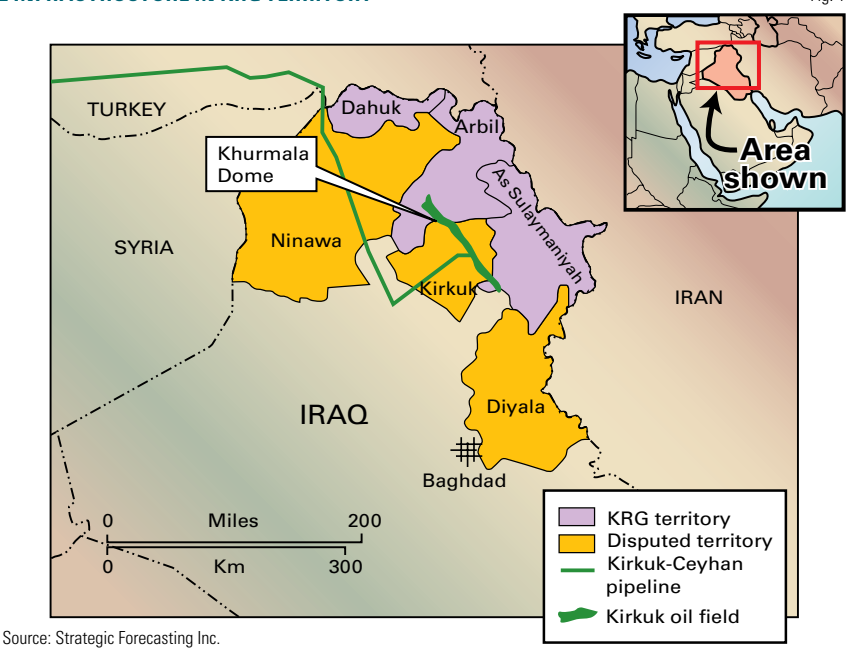
Predictably, the oil ministry sent letters to companies that have signed exploration and production agreements with the KRG, canceling any prior agreements with Baghdad.

Cancellation letters were sent to SK Energy of South Korea, OMV, and Reliance Energy, and the central authorities also cut crude exports to SK Energy.[11] International Oil Daily reported that South Korea is attempting both to fulfill its need for Iraqi oil and concurrently retain the KRG contract.[12] South Korea imports about 125,000 b/d and likely will make up its shortfall from neighboring countries.[12]

South Korea has been trying to

Oil infrastructure in KRG territory

Fig. 1



Source: Strategic Forecasting Inc.

resolve this dispute through diplomatic and political measures. KRG Prime Minister Nichervan Barzani visited South Korea to meet with its president-elect Lee Myung-Bak to reassure that all the energy deals signed were legal as per the Iraqi oil and gas regime. Further, during the meeting, Myung-Bak requested more cooperation with the KRG for expansion of oil and gas development by South Korean companies in the Kurdish region.

One of the more controversial PSAs is with US-based Hunt Oil. The territory under exploration falls outside of the Kurdistan region, in the Ninawah Governorate. This region was historically populated by Kurds, who the KRG hopes will join the region along with Kirkuk after the referendum.[13] If the central government's suspicions are true, the KRG has broader political ambitions in the control of oil and gas in disputed areas adjacent to its territory (see map).

Potential export impact

For all the rhetoric, the Kurds depend on Baghdad for the export of oil. The KRG may legally be able to sign contracts to the dismay of the central authorities, but it also needs a secure and reliable oil export route. The Kurdish region in the north is essentially landlocked in its ability to export oil.

With the central authorities in control of the southern Basra port, Umm Qasr, the Kurds must look to often hostile neighbors. An existing overland oil pipeline extends from northern Iraq to the Turkish port of Ceyhan, but Turkey has an existing contractual arrangement with Baghdad—which also secured an agreement with neighboring countries Iran and Syria—to prevent the KRG from circumventing Baghdad's restrictive embargo on KRG oil.[14]

Although the Kurds could opt to smuggle the oil overland through routes in Syria or Iran in contravention of the embargo, this option would be quite risky and expensive if undertaken.[15] Northern Iraq, which is thought to sit upon substantial oil reserves, must currently resort to importing or "smuggling" refined fuel from neighboring countries. This region lacks refineries, and none of the region's oil installations is connected to Iraqi refineries for smooth export.

Moreover, Syria and Iran, which have little incentive to see a prosperous Kurdish-dominated region, have pledged their assistance to Baghdad in any potential blockade.

Many firms also would be reluctant to sign any further contracts if a legal and safe export route were not available. For example, DNO, the Norwegian oil firm, has repeatedly asked that Baghdad grant an export permit as an inducement for increased production.[16]

Any overland smuggling route through Turkey would most likely be blocked by Ankara as it also fears the development of a vibrant and autonomous Kurdish region, which could stir Turkey's own restive Kurdish population.

However, the political impasse may be the ultimate force to spur compromise between the various stakeholders.[17] Pressure is mounting against the KRG's position. On Jan. 15, 2008, a majority of Iraq's parliamentarians signed a public statement denouncing the KRG's "unilateral" actions to sign contracts. Osama Najafi, of former Prime Minister Ayad Allawi's secular National List party, stated at a news conference, "[There] must be a formula for maintaining the unity of Iraq and the distribution of its wealth."

After the KRG and Hunt Oil signed a production-sharing contract in 2007, the US State Department cautioned that this collaboration hurt Baghdad's efforts to "reconcile and rule the country."[18]

Rightful jurisdiction

Which governmental level has rightful jurisdiction? Article 111 of the Iraqi constitution states that oil and gas are the property of all Iraqi people; however, Article 112 vests Baghdad with authority to manage existing fields.

The phrase, "existing field," is not an industry-specific term; therefore, it leaves room for considerable ambiguity. Proceeds from these "existing fields" are to be shared on a per capita basis, with certain benefits given to regions that bore the brunt of Saddam's brutality and economic exclusion.

By the simplest logic, new fields are to be managed by the regions as they see fit. The duty to allocate proceeds is also ambiguous because only Article 112 deals with proceeds and only in conjunction with existing fields, not new fields.

It appears that the KRG has a stronger legal argument because Baghdad has no jurisdiction over general exploration or production. Yet the KRG is constrained by Article 112, which declares that the central authority and the resource-rich regions will exercise joint authority to set national oil and

The author

Justin Dargin (Justin@interintel.net) specializes in the study of international law and energy law and is a prolific author on energy affairs. He trained at Owens Corning global headquarters in the international legal department for adherence to the Energy Policy Act of 2005 and for compliance with the Patriot Act provisions. He also completed training in the legal department at the Organization of Petroleum Exporting Countries (OPEC), where he advised senior staff as to the implications of European Union and American law in multilateral relations. He served as a researcher at the Oxford Institute for Energy Studies, where he studied Middle Eastern gas issues, and pioneered the first major work on transnational gas trade in the form of the Dolphin Project. His most recent major publication is "The Dolphin Project: The Development of a Gulf Gas Initiative" Oxford Institute for Energy Studies Working Paper No. 22 (Jan. 2008). Dargin holds a BBA in management and information systems from the University of Michigan and a JD from Michigan State University. He also studied international petroleum law at the American University in Cairo. He is a member of the Association of International Petroleum Negotiators and a founder and director of the International Institute of Ideas (Interintel), a not-for-profit organization dedicated to facilitating informational exchange between academia and the business sector. Fluent in Spanish, English, and Arabic, he is a frequent presenter on the lecture circuit in matters relating to oil and energy.

gas policy.

At the very least it will seem that the regions must consult with central authorities in Baghdad to set a national oil policy.

Further, the KRG is limited by the practical, ground-level reality that Baghdad has the capacity to establish an embargo on oil exports from the KRG and effectively block the flow of Kurdish oil.

As this article goes to press, the parties have engaged in neither a public reconciliation nor meaningful debate. Oil and gas companies contemplating oil deals in Iraq likely will have to deal with the central authorities one way or another in order to effectively plan business strategy for exploration and production with the KRG. However, one undeniable truth remains: If this shattered land is to heal and develop its economic potential, the stakeholders will have to soon come together to resolve their differences. ✦

References

1. Iraqi constitution, Sect. 1, Article 1.
2. Ibid, Sect. 1, Article 4.
3. "Iraq's Kurdish Region approves four new oil deals," Reuters' UK, Oct. 3, 2007, (http://uk.reuters.com/article/oilRpt/idUKL0373334120071003).
4. "The KRG's bold moves on oil," Strategic Forecasting Inc., Nov. 30, 2007.
5. Sumedha Senanayake, "Iraq: Kirkuk referendum likely to be delayed," RFE/RL, Sept. 13, 2007.
6. "Baghdad-KRG oil rift deepening," The New Anatolian, Oct. 15, 2007. (http://www.thenewanatolian.com/tna-29281.html).
7. Sumedha Senanayake, "Iraq: Baghdad, Kurds at odds of oil deals," RFE/RL News Analysis, Nov. 30, 2007.
8. "Iraqi oil minister authorized to ban Kurdistan oil exports," KurdNet, Nov. 24, 2007.
9. Kathleen Ridolfo, "Iraq: Kurds push ahead with oil contract," RFE/RL, Nov. 12, 2007.
10. Senanayake, Supra Note 14, "Iraq: Baghdad, Kurds at odds of oil deals."
11. "Iraq makes good on Kurd oil blacklist," United Press International, Jan. 21, 2008.
12. International Oil Daily, Mar. 5, 2008, and "KRG minister says new South Korean energy deal constitutional," Kurdish Regional Government Website, Feb. 15, 2008. (http://www.krg.org/articles/detail.asp?lngnr=12&smap=02010200&rnr=73&anr=22781).
13. Interview with Issam Chalabi on KRG and Hunt Oil, Middle East Economic Survey, Oct. 15, 2007.
14. Senanayake, Supra Note 20, "Iraq makes good on Kurd oil blacklist."
15. "Kurdish struggle for Iraq's oil," BBC News, Jan. 3, 2007, (http://news.bbc.co.uk/2/hi/business/6211853.stm).
16. "DNO: Iraqi Kurd oil needs export route," United Press International, Feb. 21, 2008.
17. "Iraq factions join against Kurd oil deals," United Press International, Jan. 15, 2008.
18. "Analysis: Hunt, State talked on Iraq oil," United Press International, Oct. 12, 2007.

COMMENT

A moment in time—Energy trade with Russia

Timothy F. Sutherland
Pace Global Energy Services LLC
Fairfax, Va.

The term "energy crisis" has been a part of our economic lexicon since the early 1970s. It is time for us to realize that "crises" don't last 30 years unless they are nurtured by perpetually poor public policy.

For the past 35 years, whenever high energy prices caused public consternation, politicians have been quick to inform the American electorate of a planned path to energy independence via a familiar and recurring set of regulations, government subsidies, and technological advances.

Over this same period, global energy markets have responded to these price signals with increasing supplies of conventional fuels. Predictably, the high prices that sparked all the rhetoric and activity soon subside. Quickly thereafter, the US government and the consumer lose interest in "advanced" technologies and return to old buying and consumption patterns. Any hope of effective public policy goes back into hibernation.

Had we acted prudently and consistently back in 1970, our current condition would have been more manageable. But we didn't. It is time we devise a management approach to this problem and stop pretending that there is an early homegrown solution. Those who sell the prospect of quickly found energy independence through investment and tax incentives are simply taking advantage of the public at best.

The US, an oil exporter for much of the last century, set the pace for building an economy and society on ample and inexpensive oil and gas. Europe, and now Asia, have followed suit. But US self-sufficiency—energy independence—is no longer within our grasp at current levels and forms of consumption, prevailing prices, and available resources and technology. It may never make economic sense.

With instability in the Middle East and declining production domestically, particularly from some of our traditional suppliers, the US must diversify its energy supply sources. This is all the more urgent as energy demand from China, India, and elsewhere is increas-

ing rapidly and new supply sources are shrinking and becoming more geographically concentrated.

The growth of global energy consumption to support broad improvements in living standards cannot be denied to the billions of people around the world whose economies are now realizing the benefits of decades of emerging economic progress.

Collectively the same size as the US market, the emerging economies are growing three times as fast, and their continued expansion will have a huge impact on future energy demand. This will not only require changes in energy consumption patterns at home and abroad, but also a sustained policy of interdependence and diversification, not xenophobic independence, among energy producing and energy consuming nations. While asymmetries may exist in specific trade relationships, the policy of interdependence and diversification among all trading partners creates net benefits for each and all.

Energy independence is not only an improbable goal, but it also leads to inconsistencies in our foreign economic policy that can blind us to potential opportunities. In pursuing this objective we deliberately reverse the economic trends of the past several decades; trends that have led to growing interdependence and its numerous benefits among both developed and developing countries in the spheres of trade, finance, and energy. Former Federal Reserve Chairman Alan Greenspan pointed to growing global trade among a widening range of market participants, more than fiscal or monetary policy, as primarily responsible for constraining domestic inflation and fueling economic growth over the past two decades.

It is within this context that we in the US must engage Russia as a central player in the global energy economy. For the US, as historically in Western Europe, Russia presents an opportunity for diversifying, not concentrating, the political risks of our reliance on energy imports. Russia has supplied Western oil markets for more than a century;

it now reliably supplies Europe with a quarter of its natural gas consumption. Despite the rhetoric from all sides and sensationalized Western press editorials on the perceived threats that Russia presents to US and Western strategic interests, Russia's long-term social and economic growth and security are much better served through economic engagement with Western economies than through isolation and confrontation.

Acknowledging these bilateral benefits in 2002, Presidents George W. Bush and Vladimir Putin designated energy cooperation as a major joint priority. Our focus on this important goal has now been lost as other issues have crowded the center stage. Selling fear rooted in the past does not protect the future. The US needs to revive this sensible bilateral policy and re-engage Russia in order to foster an interdependent relationship based on shared concerns and reciprocal needs.

OAO Gazprom, Russia's largest oil and gas company, now comes knocking on North America's front door with offers of competitively priced natural gas delivered as LNG. As the US and Canada appear to be at best on a treadmill when it comes to natural gas production, such diversification of supply sources should be welcome. Partial reliance on Russian gas supplies is not a threat to our economic security, but an act of supply diversification that reduces overall energy security risk and brings benefits to both countries.

Gazprom is not a passive participant in world energy markets, but few have ever accused the titans of the energy industry, irrespective of where they are domiciled, of engaging in a gentleman's sport. The energy business is brutally competitive. Gazprom has been financially successful in its energy export business through tough negotiations with its peers and counterparties. If this does not make it cuddly in the eyes of the West, perhaps that is the fate of all major international energy firms, which must pursue their commercial objectives in a highly politicized environment. And note that all national governments, including the US, actively promote and assist homegrown energy firms in pursuit of national interests.

It is time to reap the benefits that an interdependent policy would offer. For the foreseeable future, the US must depend on its trading partners to supply a large share of our energy supplies, primarily in the form of oil and gas. It makes perfect sense to ensure that these sources are as diversified as possible while we develop and deploy truly game-changing technologies and more energy-efficient practices.

The US and Russia must acknowledge the symbiotic value of bilateral energy trade and its role in expanding commercial and economic relations that will build and sustain mutual trust between our two countries. It is my hope that dialogue replaces the noise so that we can capitalize on this moment in time to promote economic security for both our nations. ✦

The author

Timothy Sutherland, founder of Pace Global Energy Services LLC, has guided the development of Pace into an internationally recognized consulting and asset management firm with extensive client relationships throughout the energy, transportation, and financial communities. With his worldwide experience, Sutherland has led the firm's development in the areas of strategic planning and strategy implementation, comprehensive fuel supply planning and acquisition, financial structuring evaluation, and private placements within the energy and transportation industries. He is an active participant on energy industry and industrial panels dealing with the market impacts of competitive restructuring. Sutherland holds an MBA from New York University.

MEGC: Oil price strength here to stay; demand fails to waver

Marilyn Radler
Senior Editor-Economics

Oil price volatility is here to stay, with prices fluctuating within the range of $70-110/bbl and averaging $85-90/bbl this year. Also, demand growth has failed to waver because new players have emerged, with growth in China and the Middle East, according to Fereidun Fesharaki, chairman and chief executive officer of FACTS Global Energy.

Fesharaki voiced his comments Apr. 7 during the opening of the sixteenth annual Middle East Petroleum & Gas Conference (MEGC), which was themed "Oil Market Fundamentals in the Middle East: Geopolitics vs. Geology."

Fesharaki, who served as MEGC conference chairman, gave a commentary on the state of the global oil and gas markets, touching on a variety of aspects.

He said for oil demand to diminish in the US, it will probably take an oil price of $150/bbl, but this price needs to come as part of a package that includes taxes, Corporate Average Fuel Economy standards, and other restrictions on consumption.

Speaking about the future of supply, Fesharaki said oil supplies from producing countries outside the Organization of Petroleum Exporting Countries will plateau within 3-5 years. Further, with OPEC's annual production decline rates of at least 1.5 million b/d and assumed annual demand growth of 1.5 million b/d, the organization needs to add at least 15 million b/d of capacity every 5 years. "This is an impossible task," Fesharaki said.

As for the global refining picture, he said from the recent refining capacity shortages that led to high prices, the world is now heading for a surplus of

capacity, and refiners in Europe and Japan will suffer the most. Meanwhile, Middle Eastern refiners are a bit late on the scene and must now focus on local markets rather than depend on exports of products. Fesharaki predicts that by 2015, the world will have a huge gasoline surplus and a sizeable diesel shortage.

As for natural gas, Fesharaki spoke a bit about LNG, saying that the buyer's market is gone forever, but markets will ease in the second half of 2009. Fesharaki also said Qatar is unlikely to raise its LNG exports above their committed 77 million tonnes/year.

In a keynote speech, Adil A. Al-Tubayyeb, Saudi Aramco vice-president of marketing, supply, and joint venture coordination, advocated transforming the Middle East energy business by creating a regional trading hub for refined products. He sees the hub of countries near the Eastern Mediterranean, Arabian Gulf, and Indian Ocean as critical in meeting both local and global customer needs.

Al-Tubayyeb said in addition to the favorable geography, the supply and demand dynamics of the region, and the growing refining capacity there, a regional benchmark should be established.

The current Arab Gulf benchmarks are not reflective of the region's fundamentals, there's no transparency, and the netbacks are based on distant markets, he said. Also, trading in the region currently uses a simplistic approach and doesn't follow Arab Gulf trade dynamics or market intelligence, and it has other drawbacks as well. ✦

BP, ConocoPhillips join to build $20 billion Denali gas line

BP PLC and ConocoPhillips announced they will join resources to build a 4 bcfd natural gas pipeline extending from Alaska's North Slope to markets in Canada and the US. Dubbed Denali, the proposed $20 billion Alaskan gas line would be the "largest private-sector construction project ever built in North America," the partners said.

In a press conference held Apr. 8, BP and ConocoPhillips revealed plans to spend $600 million over the next 36 months on the first of many phases of the Denali line, namely an open season, which is slated to begin before yearend 2010. After the open season, the companies will file to obtain certification from the US Federal Energy Regulatory Commission and Canada's National Energy Board for authorization to move forward with construction of the project.

The partners also will have to convince Alaskan authorities that their plan is the best one for developing the state's gas resources and that it's in line with the state's Alaska Gasline Inducement Act (AGIA), passed midyear 2007 and adopted in February. AGIA, which was designed to advance construction of a gas pipeline from ANS, requires a pipeline project builder to meet certain requirements that will advance the project, in exchange for a license that provides up to $500 million in matching funds. These funds would help reduce the financial risks that such a huge project faces in its early stages.

Alaska received five applications for gas pipeline proposals. These came from AEnergia LLC, the Alaska Gasline Port Authority, the Alaska Natural Gas Development Authority, Little Susitna Construction Co., and a joint application from TransCanada Alaska Co. LLC and Foothills Pipe Lines Ltd. TransCanada's proposal was the only one to be accepted as completed. A proposal submitted by ConocoPhillips did not meet the state's application criteria, the state said. BP and ExxonMobil Corp. did not submit an application.

Alaska Gov. Sarah Palin said of BP and ConocoPhillips's latest effort: "We look forward to any progress they will be able to show us on this project. Their decision to proceed is further proof that competition does work."

As OGJ went to press last week, TransCanada had not released any comment regarding BP and ConocoPhillips's announcement. The Calgary-based firm however already is working with ConocoPhillips to construct the 2,148-mile Keystone oil pipeline from Alberta to the US Midwest and Cushing, Okla.

Project details

BP and ConocoPhillips said they will form a new company, to be headquartered in Anchorage, to manage the Denali project. During the Apr. 8 press conference, the companies reported that a joint project team has been mobilized and that field work will begin this summer on the line.

The project will comprise about 2,000 miles of large-diameter, buried pipeline that will transverse Alaska, the Yukon Territory and British Columbia to Alberta. The line will operate at about 2,500 psi and will have 40,000-hp compressor stations every 100-200 miles. A gas treatment plant will be built near existing Prudhoe Bay facilities. The line will require 5-6 million tons of steel, the partners said.

The companies said should it later be required to transport gas on from Alberta, the project will also include about 1,500 miles of large-diameter line from Alberta on to the Lower 48 states. The companies said they would seek "other equity partners, including pipeline companies," that would "add value to the project and help manage the risks involved." Press reports have indicated that ExxonMobil Corp., the third-largest ANS producer, has been asked to join.

The partners said the Denali line will support in-state gas distribution efforts including gas to south-central Alaska. The line will provide at least five Alaskan offtake points, including Fairbanks.

WATCHING GOVERNMENT

Nick Snow, Washington Editor

The counterpoint from local voices

When Independent Petroleum Association of Mountain States members came to Washington, DC, for their annual "call-up" visits to Congress and regulators in early April, other business leaders from their communities came along.

They provided an important counterpoint to groups trying to stop or slow federal leasing on the Roan Plateau in Colorado and elsewhere. Many are officers in their local Chambers of Commerce. IPAMS welcomed them to help describe collaboration on subjects such as community relations and workforce needs, according to Marc W. Smith, the group's executive director.

"We wondered why none of these groups had come forward. No one had ever asked them," explained Susan Avillar, a Williams Cos. community affairs representative from Parachute, Colo.

"The companies which are operating where I live and work have tried to reach out to people," she told me. Two weeks after the Washington visits, wildlife managers from five states were scheduled to meet in Grand Junction. Avillar said Williams and EnCana USA, which also is active in the area, planned to show their operations to the government officials.

Sharing complaints

The effort doesn't stop with state and local governments. "We have a program with other companies where we share complaints. There's a real spirit of trying to work together and be good neighbors," Avillar said.

Other efforts range from underwriting an area-wide mule deer population study to forming an energy advisory board with Garfield County residents and government officials to discuss issues.

Contractors are involved, too. In one area, they joined operators in "Community Counts," a pilot program where they meet regularly with local officials and employees to avoid moving a rig when a school bus is on the road or to help notify residents that a fracturing program could raise excess dust.

"In Garfield County, an operators' group meets monthly to discuss common issues. This time of year, they involve mud and dust," Avillar said. When one surface landowner in a split-estate situation complained about dust, Williams sent out a water truck.

Pristine? Untouched?

Such efforts are crucial as opponents characterize the Roan Plateau as pristine and untouched when oil and gas activity has been taking place there for years. Williams has been there on private leases since the late 1980s, currently has 24 wells on the Roan, and plans to drill 28 more in 2008, Avillar said.

Smith said IPAMS is following examples of politicians ranging from US President George W. Bush to Dave Freudenthal, Wyoming's Democratic governor, who bring groups with common interests together.

"I'm loading my calendar with tours," Avillar said, noting that during 2007 she and her EnCana counterpart showed their companies' operations to 850 people, including "gifted and talented" fifth graders who asked awkward but interesting questions. ✦

'Great news' for Alaska

Sen. Lisa Murkowski (R-Alas.) welcomed the announcement. "It is great news for Alaska that companies that control well more than 60% of the North Slope's natural gas are now committing themselves to move ahead to build a gas pipeline. This should give utilities in the Lower 48 states and suppliers worldwide some confidence in planning on Alaska's gas getting into America's market by about 2019, which is probably the most important ingredient in making sure that Alaska's gas is not replaced by an imported liquid natural gas," she said.

Murkowski also congratulated Gov. Palin for helping to bring about the ConocoPhillips-BP announcement. "By her tough stance over the past 2 years, she has brought the companies around to building a gas line now. It is unlikely this announcement would have come today, if not for a process like AGIA that has crystallized the outlook for development of Alaska's North Slope gas reserves," Murkowski said. "Hopefully, before too long, TransCanada will be brought into this marriage, as I hope ExxonMobil also will decide to join in the not too distant future," she added.

'Positive and important'

The Senate Energy and Natural Resources Committee's leadership applauded the news. Chairman Jeff Bingaman (D-NM) called it "a positive and important" development which would do more than bring vast reserves of previously stranded North Slope gas to markets. "In addition, as the largest private construction project ever in North America, the pipeline will provide great economic stimulus by creating thousands of jobs and business opportunities in the US and Canada," he said.

Pete V. Domenici (R-NM), the committee's ranking minority member, said, "Ultimately, when constructed, the new Alaska gas pipeline will bring natural gas in Alaska's North Slope to Alberta, where it can eventually connect with existing lines and be brought to the Lower 48 states. With uncertainty

surrounding our ability to meet future natural gas demand, and the potential for more exploration in Alaska as a result of constructing the pipeline, this project is vital."

Rep. Joe Barton (R-Tex.), ranking minority member of the House Energy and Commerce Committee, said that the project will bring "vast amounts of both natural gas and economic opportunity to the Lower 48, and that's why I wish we could open it today instead of having to wait 9 years for the construction.

"The United States has subsisted on the same gas supply levels for the last decade, and you can see it in the steadily rising cost of heating our homes. That might be even more expensive without the unfortunate 19% reduction by industrial gas users, reflected in closed plants and lost jobs. This new pipeline will counter both those unhappy trends by adding 4 bcfd to our supply, which is enough to fill 6-8% of America's daily requirement," he continued.

"Life in America requires energy, and we've got enormous reserves of it right here in the neighborhood. Maybe that's the most important aspect of today's agreement: It's a move to be self-reliant instead of betting more of our future on energy from across the oceans," Barton said.

A new web site outlining the pipeline project has been launched at denali-thealaskagaspipeline.com. ✦

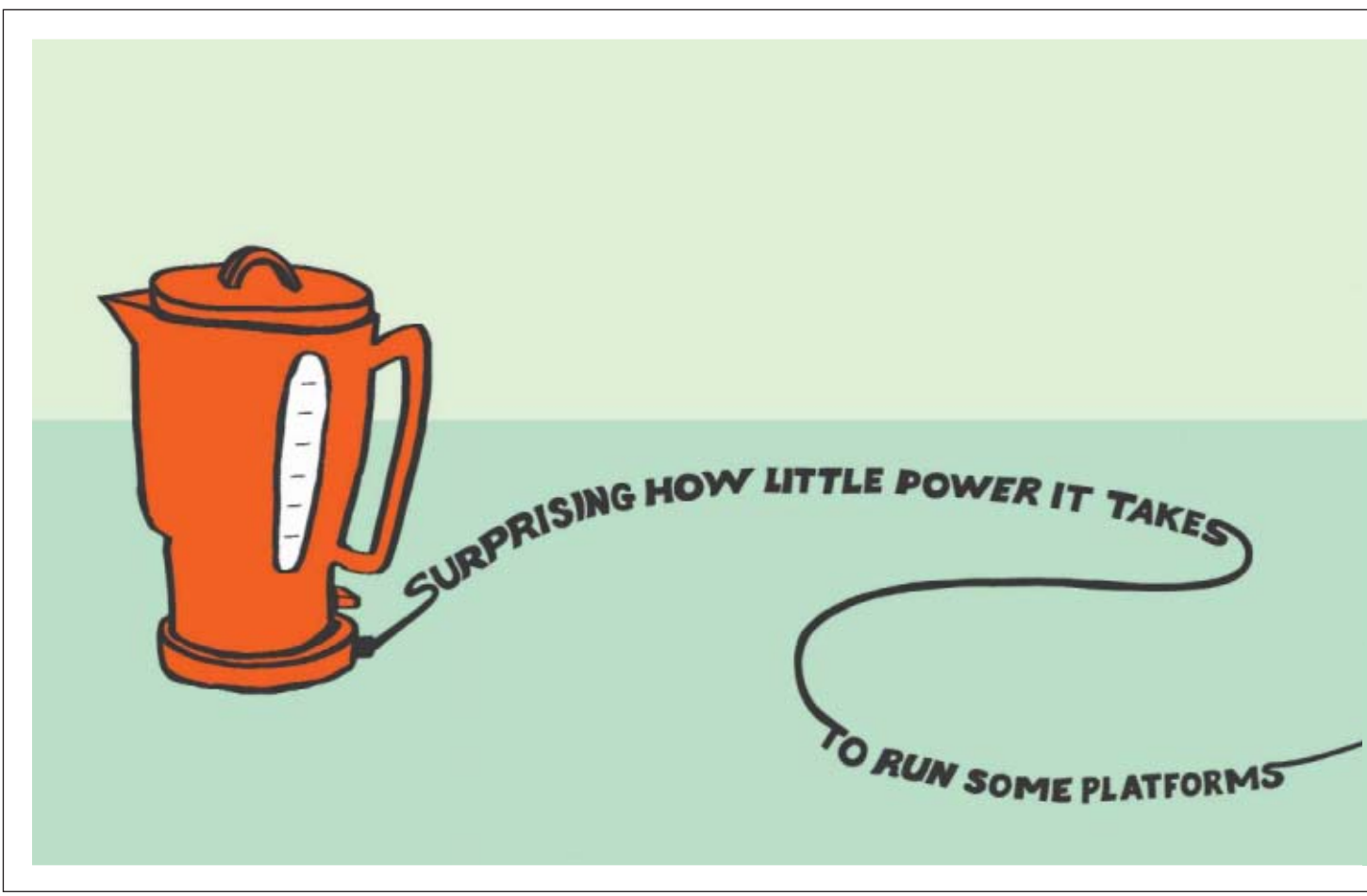
Senators say high oil prices may reflect rampant speculation

Nick Snow
Washington Editor

Two US Senate Energy and Natural Resources Committee members said on Apr. 3 that they will push for more aggressive financial market regulation if they don't get a better idea of speculators' impacts on crude oil prices.

Democrats Byron L. Dorgan (ND) and Maria Cantwell (Wash.) each said the US Commodity Futures Trading Commission's (CFTC's) oversight still does not include transactions that occur outside regulated commodity exchanges. Deals for oil as an investment may be distorting its actual value and aggravating economic uncertainty, they warned.

"These energy prices are having enormous consequences. We have people buying what they'll never get from people who never had it. Twenty times more oil is sold in these markets



than exists," Dorgan said.

When Cantwell asked three energy analysts who testified if they predicted a year ago that oil prices would exceed $100/bbl, they all said they did not and declined to forecast where prices would be 6 months from now. "You're basically saying this is all over the map and you don't know what the price will be. If we're going to protect our economy, we need to close loopholes that keep this activity in the dark," she said.

Speaking with reporters outside the hearing, the senators separately said that they will try to increase regulatory authority and funding at the CFTC, Federal Trade Commission, and Securities and Exchange Commission as part of the three agencies' fiscal 2009 appropriations.

"Where were the regulators? Who was minding the store? This is something that has occurred throughout this administration. The chairman of the SEC promised a business-friendly environment when he took office. What kind of a signal did that send?" Dorgan said.

Growing participation

Other committee members agreed that growing participation by traders seeking oil purely as a financial asset requires more attention, but they stopped short of calling for increased regulation. Chairman Jeff Bingaman (D-NM) noted in his opening statement that the Government Accountability Office reported last fall that the average daily contract volume for crude oil traded on the New York Mercantile Exchange increased by 90% during 2001-06.

It also noted that the average daily number of noncommercial participants in crude oil markets, including hedge funds and large institutional investors, more than doubled during 2003-06, he said.

"It seems that just as the demand for physical barrels of oil has grown with the global economy, there is an increasing demand for oil purely as a financial asset," Bingaman suggested.

"Untangling whether and how these dual sources of demand may be operating in concert and potentially impacting oil prices is complicated. But, certainly, I think it's accurate to say that there is a growing suspicion on the part of many Americans that, in the very least, Wall Street's geopolitical judgments may be serving to increase current pricing trends," he continued.

Sen. John Barrasso (R-Wyo.) noted that factors ranging from growing demand and declining excess supply capacity to the US dollar's falling value and increased reliance on politically unstable and sometimes unfriendly foreign suppliers are pushing oil prices higher. Adding that domestic production must expand, he asked if more regulation would lead to America's losing its leadership in financial markets.

Pete V. Domenici (R-NM), the committee's ranking minority member,

WATCHING THE WORLD

Eric Watkins, Senior Correspondent

Of polar bears and light bulbs

The Chukchi Sea in Alaska could one day compare with the US Gulf of Mexico as a source of energy for the US, according to a statement by Rick Fox, assets manager of Royal Dutch Shell PLC's Alaskan unit.

Fox claimed that the acreage, off the state's northwest coast, could yield one of the "potentially most prolific oil fields" left in the world, with some 100 different geological plays estimated.

The US Minerals Management Service estimates that the Chukchi Sea might contain 15 billion bbl of recoverable oil and 2.2 trillion cu m of natural gas.

According to the MMS's environmental impact assessment, however, new offshore drilling would introduce a 33-51% chance of a major oil spill, an occurrence which could have a severe impact on polar bears and other marine mammals.

Last week, an obstacle to exploitation took place when the National Wildlife Federation urged Congress to protect America's polar bears from the impacts of climate change. It wants Congress to list polar bears under the Endangered Species Act (ESA).

Threatened species?

Facing a court-imposed deadline, the US Fish and Wildlife Service (FWS) last year proposed to list the polar bear as a threatened species under the ESA. FWS was required by the ESA to issue a final listing decision 12 months later.

FWS missed the deadline nearly 3 months ago, raising suspicions that the administration of President George W. Bush was seeking to avoid scrutiny of oil and gas leases in polar bear habitat under the ESA when it proceeded to sell exploration licenses for the Chukchi Sea on Feb. 6.

"The [ESA] clearly states that listing decisions must be made based on the best available scientific data, not on the political or economic consequences of the listing," said Dr. Doug Inkley, a senior scientist at the National Wildlife Federation.

"The science clearly shows the polar bear's future is on thin ice," Inkley told Congress. "The legal protections provided under the [ESA] would be a first step towards minimizing the impacts of global warming and other threats on the polar bear."

Northern Lights

Actually, a first step has already been taken in Churchill, Man., by ecotour outfitter Natural Habitat Adventures (NHA), which is helping shed light on climate change while providing real community service to the town dubbed "The Polar Bear Capital of the World."

NHA's Bulbs-for-Bears program is enlightening homes and businesses in the 1,000-resident community with some 3,600 compact fluorescent light bulbs provided with the help of corporate sponsor Gaiam.

The donated bulbs are projected to save residents more than $150,000, as well as reduce greenhouse gas emissions. To us, that seems like a bright idea—one that balances the need of the bears with those of the people in the region.

After all, no one has proposed that the people of Churchill turn off their electricity. That really could be, uh, unbearable. ✦

noted that Rep. John B. Larson (D-Conn.) plans to introduce a bill that would require investors to take delivery of crude oil and petroleum products. Doing this would eliminate speculation by those who are driving prices higher from oil and gas markets, Larson said in Hartford on Mar. 31 as he announced his plan. He plans to introduce the legislation soon, a spokeswoman told OGJ on Apr. 4.

"For me, after today's testimony, I wonder whether we haven't made a mistake in not trying to regulate speculators on the oil market more closely," Domenici said during the hearing.

Proposal's impacts

But Jeffrey Harris, CFTC's chief economist, warned that Larson's approach would remove from the market an entire class of investors who take positions that others won't take. "I don't think trying to identify speculation's part of today's oil price constructively moves the discussion forward," added another witness, Sarah A. Emerson, managing director of Energy Security Analysis Inc., Wakefield, Mass.

"There's a difference between speculation and the casino example used earlier," she told the committee. Institutions such as the California Public Employees Retirement System (CalPERS), the largest US public pension fund, buy oil derivatives to add value to their portfolios, Emerson said. "These are not gamblers," she maintained.

A third witness, Cambridge Energy Research Associates Managing Director James Burkhard, also said that noncommercial investors are not simply short-term speculators but include pension fund, university endowment, and other institutions' financial managers. They also help keep markets liquid, he indicated.

"The growing role of noncommercial investors can accentuate a given price trend, but the primary reasons for rising oil prices in recent years are rooted in the fundamentals of demand and supply, geopolitical risks, and rising industry costs," Burkhard said. "The

decline in the value of the dollar has also played a role, particularly since the credit crisis first erupted last summer when energy and other commodities became caught up in the upheaval of the global economy."

As lower interest rates and anticipation of further cuts pushed the dollar lower, oil became what Burkhard called the "new gold," a financial asset in which investors seek refuge as inflation rises and the dollar's value weakened. "Today's dynamics in the marketplace reveal oil's increasingly cosmopolitan nature," he said. "Its price reflects not only demand and supply, but broader macroeconomic and geopolitical changes such as the growing influence of Asia, the Middle East, Russia, and the Caspian countries," he said in his written testimony.

Won't last forever

Kevin Book, senior vice-president of FBR Capital Markets Corp., Arlington, Va., said it may be true that noncommercial buyers of oil forward and futures contracts may be driving the price higher because institutional investors are seeking a value-retaining refuge from the falling dollar. "This phenomenon certainly won't be true forever and may not even be true for long," he said.

"If funds flowing into commodities are indeed elevating oil futures, then accumulating evidence of a slowdown within the world's biggest oil consuming economies could provoke an equal and opposite reaction as conservative investors close their positions and aggressive investors sell short," Book said.

Book and other witnesses noted that sovereign funds, which invest oil-producing countries' revenues, are a growing noncommercial oil futures class. Harris said the CFTC is aware of this group's activities but does not have extensive data on it. He also confirmed that the agency's staffing is at an historic low at a time when futures and derivatives trading are at an historic peak. "We can see what's happening in markets we don't regulate by the behavior of large traders and other reports we receive," Harris said.

Emerson pointed out that national oil companies in producing nations are making a lot of money and investing a lot of it in new capacity, which is good. Asked by Bingaman about steps the US could take, she replied, "There's no quick fix. I think the margin requirements need to be raised for oil futures trading. It's one tool Congress can use." Other witnesses agreed.

Burkhard said that oil prices in the $110-120/bbl range over 6 months would reduce demand even in China, India, and other economically growing nations. "It can't keep climbing, and there will be some relief. But it's important to remember that an entire generation of employees didn't enter the oil industry in the 1980s and '90s because the price was so low. It could take 10-15 years to recover from this," he said.

Dorgan remained skeptical. "You'd have to be drunk to not understand that when you run an $800 billion trade deficit, it won't have an impact on the value of the dollar," he conceded. "But there also are speculators involved." ✦

Congress enters new phase of climate change deliberations

Nick Snow
Washington Editor

US House Energy and Commerce Committee Chairman John D. Dingell (D-Mich.) recognizes some familiar complaints and proposals as Congress discusses energy and environmental issues in 2008. He also expects the coming battles to be the toughest yet.

"It probably will be the most complex and difficult discussion in my time in Congress. The Energy Information Administration's role in analyzing potential impacts of various proposals will be critical," the veteran federal legislator told attendees Apr. 8 at EIA's Annual Energy Outlook conference.

"This is one of the most crucial periods for energy policy in the history of this nation," said Dingell, who was a major force behind EIA's creation 30 years ago. "We now confront the same issues we have over the years. We seem to be enacting the same kind of legislation in response to the same problems: limited supplies, rising prices, and citizen complaints."

The major difference is that voters and lawmakers are incorporating global climate change issues in energy discussions, he said. "We ended 2007 with an energy bill we all can be proud of, with tougher automotive fuel efficiency standards and expanded biofuels incentives," he said.

"EIA did not endear itself to Congress when it reported that the benefits won't be fully realized because the programs probably won't be fully funded, but that's why we put it in business: to offer unbiased assessments of our actions, even when it isn't what we'd like to hear," Dingell said.

The next phase

Congress now is in a new phase of its global climate change deliberations as it considers whether to enact a carbon cap-and-trade program, Dingell said. The Senate has the bill cosponsored by Joseph I. Lieberman (I-Conn.) and John W. Warner (R-Va.) while Dingell's committee is discussing whether elements of the successful sulfur dioxide program from the 1980s can be used in the more difficult carbon dioxide situation.

"We are moving forward, but not as quickly as we'd like. But we are determined to get it right," he said of his committee's efforts. One question is whether a carbon cap-and-trade

program would use State Implementation Plans, New Source Review, or an entirely new approach, Dingell said.

"We're looking at carbon capture and storage, new technologies, and other components to continue using coal in an environmentally proper way, since the United States is, in fact, the 'Saudi Arabia of coal.' Any plan also must include judicious use of our domestic natural gas resources. It is my hope that we can adopt legislation to address all these problems before the end of this year," he said.

Robert M. Simon, Senate Energy and Natural Resources Committee's staff director, said he does not expect Congress to pass a comprehensive climate change bill in 2008. "Our chances of having one by the end of this session aren't good, so the question becomes what smaller steps can be taken," he said.

Simon said Congress has passed three major laws (namely, the Energy Policy Act of 2005, the America Competes Act of 2007, and the Energy Independence and Security Act) that started to address global climate change.

'Robust oversight'

"The whole process of moving an important policy forward is remembering what you've done and continuing to make progress," Simon said. "Part of this is a robust oversight program to make sure these laws' provisions are implemented and the results are what Congress intended."

John Shanahan, who until recently served as senior minority counsel on the Senate Environment and Public Works Committee, and two current congressional Republican staff members each said that US carbon emissions reduction programs won't have a meaningful impact unless other countries participate.

"Last year, [the US Environmental Protection Agency] found that without China taking aggressive action, emissions would continue to go up even if the United States adopted aggressive standards," Shanahan said. "If, by our actions, we let China off the hook, we will have economically retrenched without environmental benefits," he warned.

Frank Macchiarola, the Senate Energy and Natural Resources Committee's minority staff director, said while China and India represented only 13% of the world's total energy consumption in 1990, the most conservative estimates put their share around 30% by 2030. "Such statistics show that energy and environmental issues must be addressed globally. Literally dozens of climate change bills have been introduced, but none of them require reductions by our global competitors," he said, adding that he expects congressional enthusiasm for global climate change initiatives to be dampened by growing economic concerns.

David J. McCarthy, minority chief counsel for energy and environment on the House Energy and Commerce Committee, generally agreed. "Most members of Congress are hearing from their constituents about the impact of higher gasoline prices. It's not just disgruntled Soccer Moms, but small businesses such as the florist who canceled deliveries one day last week because the price of flowers did not equal the cost of gasoline," he said.

Gas collection points

Shanahan said the Lieberman-Warner bill is headed for the Senate floor without substantive hearings before the Environment and Public Works Committee on questions such as natural gas carbon cap-and-trade payment collection points, which could create unexpected problems. Republicans who proposed 108 amendments were told that questions such as nuclear power's role would be addressed during floor debate, he said. "Then the message became that the bill can't be changed and will be recalled if it is watered down," Shanahan said.

Pete V. Domenici (R-NM), the Senate Energy and Natural Resources Committee's ranking minority member, said the US should reduce carbon dioxide emissions but added that impacts will

be minimal without international cooperation. "Some of America's foremost economists are questioning the value of a cap-and-trade system. As we approach floor debate on the Lieberman-Warner bill, I hope common sense prevails," he said in separate remarks on Apr. 4.

"We have to consider complex issues in a sober manner, but we can't stand still," said Simon. "Absent an effective program to address global warming, we're stuck. We're not building new coal-fired power plants, nuclear isn't being serious considered, and we're continuing our de facto reliance on natural gas to generate electricity. Even if we do nothing, energy prices will continue to go up."

Macchiarola said any climate change strategy will need to tap private markets. Simon responded that investors are waiting for Congress to set the ground rules. "When you get a bunch of investment bankers in a room, their first question is when Congress will put a price on carbon," he said.

Former US Rep. Philip R. Sharp (D-Ind.), the current president of Resources for the Future, who moderated the panel discussion with the four congressional staff members, recalled that Congress debated plans to reduce sulfur dioxide emissions for years in the 1980s but did not act until George H.W. Bush became president and initiated a specific plan. The same could be true of a carbon cap-and-trade program and George W. Bush's successor, Sharp suggested.

The congressional staffers observed that there can be a major difference between what a candidate says during the campaign and what he or she actually does upon election. McCarthy added that of the 4,000 interviews the two major parties' presidential candidates have given, only four dealt with global climate change. "Health care and the economy are bigger issues now," he said. ✦

APPEA: Australia plans future energy security assessment

Rick Wilkinson
OGJ Correspondent

Australia is to undertake a national energy security assessment that will include the country's future liquid fuels outlook. The NESA will provide the basis for a new energy white paper before yearend.

Resources and Energy Minister Martin Ferguson revealed these plans during his principal address on the opening day of the Australian Petroleum Production and Exploration Association (APPEA) Conference in Perth.

The minister said Australia was "oil challenged," but Australia is a world-class natural gas province.

Ferguson said Australia has about 10 years' worth of oil supplies at current production levels without any further discoveries. The country also will have to deal with a $25 billion (Aus.) trade deficit in petroleum products by 2015.

Australia should continue to diversify its energy resources, Ferguson noted. For example, he said it is as important for the nation to encourage exploration in frontier basins as it is to push for research and development of alternative fuel industries, including the potential to convert some of the country's vast gas resources to synthetic fuels.

Regarding Australia's vast gas resources, Ferguson said, "We have been finding gas faster than we produce it for a quarter of a century and we have well over 110 years' worth of remaining resources at today's production rates," he said. "In fact, there is significantly more if we include the vast potential of coal seam methane where Queensland is leading the world in production technology."

Ferguson said the move to "energize change" in Australia is about creating the partnerships necessary between governments and industry to get more major projects off the ground. He added that it was an enormous challenge in an escalating cost and tightening investment and labor environment.

"But the rapidly growing LNG market in the Asia-Pacific—and the Indian rim—will not wait for us," he said.

Ferguson said several LNG project proposals could result in Australia's LNG exports to reach 60 million tonnes/year by 2015, ranking the country as the world's third-largest LNG exporter behind Qatar and Nigeria. These project include Gorgon, Browse, Ichthys, Wheatstone, Pilbara LNG, Darwin Phase 2, and Gladstone.

This gas outlook, however, excludes discoveries in the country's north and northwest such as Caldita, Chandon, Clio, and Thebe, or more-remote fields such as Scarborough. Ferguson said these finds are all part of Australia's future and that no responsible government can sit idly by and allow them to be stranded.

He added that the productivity commission's review of regulatory and approvals processes is a very important opportunity for governments to streamline major project development processes for investors.

The minister also said the government will be rigorously applying the test of commerciality to retention lease renewals and conducting a review of the retention lease system for the Ministerial Council on Mineral and Petroleum Resources. ✦

Exploration companies drawn to more of world's remote areas

Exploration in remote basins is at a high level worldwide.

High oil and gas prices and strong demand have drawn more explorers into nonproducing and underexplored areas.

Seven such areas randomly selected are summarized in the following account: Ethiopia's Danakil depression, Peru's Talara and Sechura basins, the Central Depression in Armenia, Nigeria's inland Anambra basin, Guyana's inland Takutu basin, northern Chile's Tamarugal basin, and the Chukchi basin off northwestern Alaska.

Danakil depression, Ethiopia

Afar Exploration Co., Tulsa, recently completed airborne gravity-magnetic data acquisition over parts of its 3.75 million acre block in the Danakil depression of nonproducing Ethiopia.

The Danakil depression is the hottest and lowest place on earth at 375 ft below sea level and as much as 145°.

Results of the surveys are the discovery of an evaporite basin to depths of 15,000 ft caused by a failed rift system parallel to the Red Sea. Reservoir rocks are the Miocene Desset sandstone at 5,000 ft and the Cretaceous Adigrat sandstone at 9,000 ft, both more than 1,000 ft thick.

Recoverable oil is expected to be in excess of 6 billion bbl.

The Dallol salt dome, 26 by 10 miles, is the main area of interest with active oil and gas seeps on its flank. The dome was discovered on a BHP Billiton field trip in the spring of 2007.

No exploration well has been drilled to date in the north half of Ethiopia. Afar Exploration expects to drill in the fall of 2008.

Other companies in the Afar region of eastern Ethiopia are Trans Global Petroleum and Lundin Petroleum.

Even more are exploring other parts of the country (Fig. 1). Numerous operators have secured blocks in the Ogaden basin in southeast Ethiopia, and White Nile Petroleum and the Ministry of Mines are running gravity and magnetic surveys on a large block in southwest Ethiopia.

Ethiopia has had no oil discovery to date. Petronas of Malaysia drilled two dry holes in the Gambela region of western Ethiopia in 2007.

Talara-Sechura basins, Peru

A group led by Upland Oil & Gas LLC plans to explore 276,137-acre Block XXIV in northern Peru.

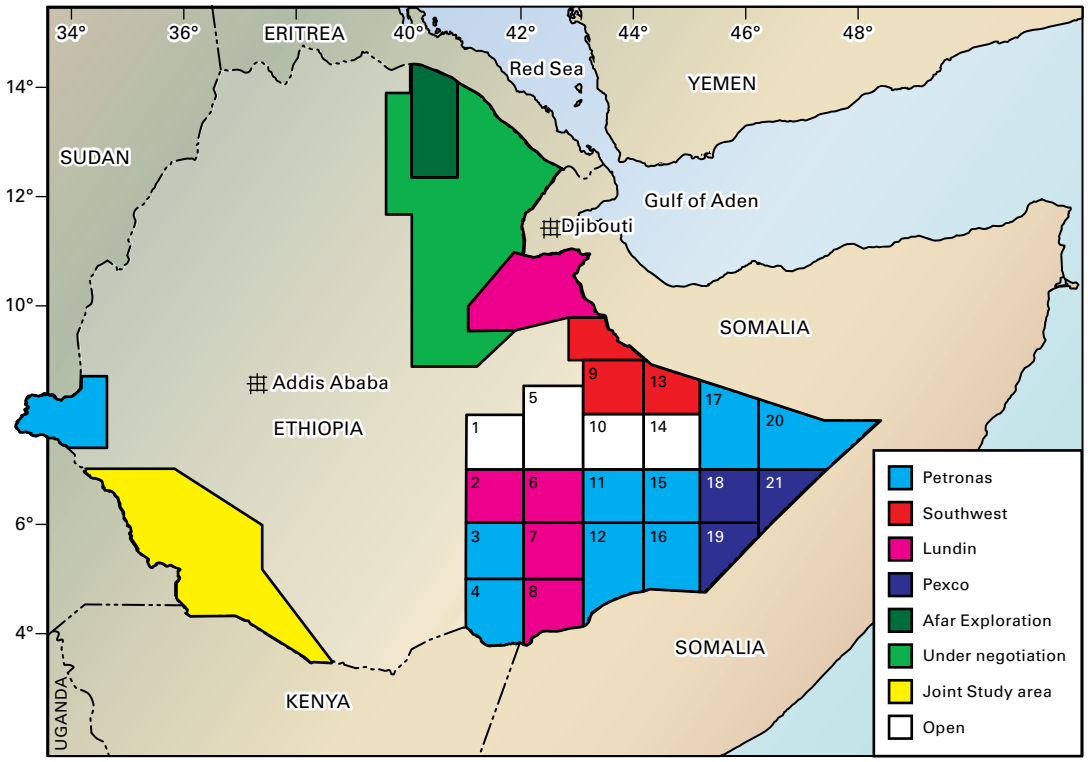
Covering part of the Talara and Sechura basins, the block has 80,000 acres in the Pacific and 196,000 acres on the coastal plain. Upland and state Perupetro signed the official contract on July 23, 2007, and EnDevCo Inc., Houston, took a 20% participation in the block in March 2008.

EnDevCo noted that other operators are drilling near Block XXIV. For example, Olympic Peru Inc. reported oil and gas discoveries in Cretaceous sands less than 5,000 ft deep in Block XII about 15 km north of the license boundary.

About 10 km south of Block XXIV,

WHO HOLDS ETHIOPIAN EXPLORATION BLOCKS

Fig. 1



Source: After Afar Exploration

Olympic in March was reentering and completing existing wells in the Late Eocene Verdun formation and established 5 MMcfd of gas production from sands less than 2,000 ft deep.

In Block Z2B some 20 km southwest of Block XXIV, Petrotech International Corp., Houston, announced an offshore discovery at the San Pedro 1X well in 2007 reportedly producing as much as 4,000 bo/d from the highly fractured Paleozoic Amotape formation.

"Initial mapping of existing offshore seismic in Block XXIV has revealed at least four prospects similar to the San Pedro discovery located in water less than 200 ft deep," said EnDevCo Chief Operating Officer Richard G. Boyce.

"Preliminary internal estimates of reserves on these offshore prospects range from a high case of 169 million bbl of recoverable oil to a low (risked) case of 26 million bbl. The onshore portions of the block are unexplored with seismic data, but airborne gravity reveals a significant undrilled basin in the interior of the block.

"The initial work program will acquire 100 km of 2D seismic across identified anomalies to better determine the prospective structures in the onshore portions of the block," Boyce said.

The base royalty on initial production is 8% up to a level of 5,000 b/d and is a maximum of 15% on all oil and gas production thereafter. The exploration contract allows for an initial 7-year exploration period and a 30-year production period. Natural gas production infrastructure is available near Block XXIV for the development of shallow gas prospects for local sale.

Central Depression, Armenia

Blackstairs Energy PLC and Vangold Resources Ltd., Vancouver, BC, formed a 50-50 partnership to explore blocks 4, 5, and 6 covering 3.4 million acres in Armenia's Central Depression.

The production sharing contract, signed on Apr. 27, 2007, is valid for 5 years with two 2-year extensions negotiable.

The work program in the initial 5 years consists of geological studies, gravity and geochemical studies, satellite remote sensing, and 170 km of 2D seismic for a total of $2.4 million.

Gerry Sheehan, Blackstairs managing director, said the commercial terms "are attractive and serve to ensure that even quite small accumulations of either oil or gas will be viable for commercial development. Armenia currently imports all of its hydrocarbons, and there is a ready open market for any indigenous hydrocarbons."

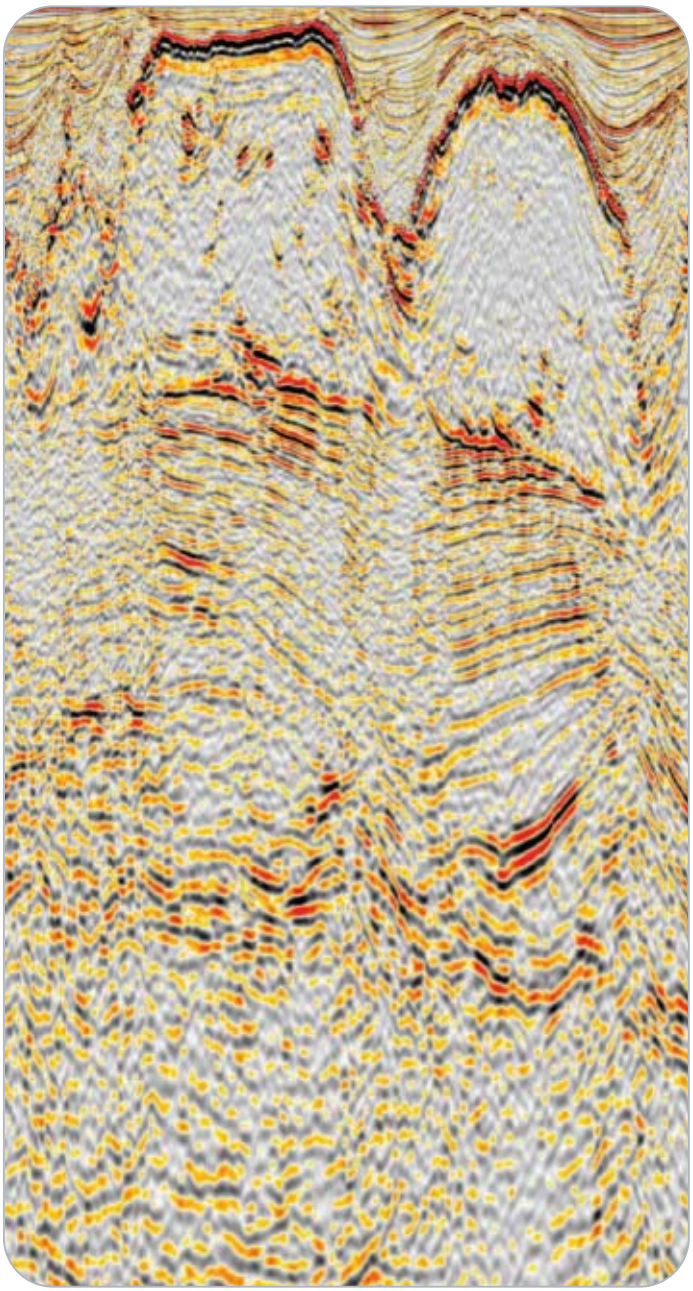
Sheehan noted that Armenia's sedimentary basins are relatively underexplored (OGJ, Aug. 12, 2002, p. 36). The geological history is complex due to the major Caucasus mountain-building structural events.

Two main sedimentary basins are recognized, the southwestern basins extending west to Armenia's border with Turkey, and the Central Depression covering the central part of the country and extending east to the border with Azerbaijan and south towards the border with Iran.

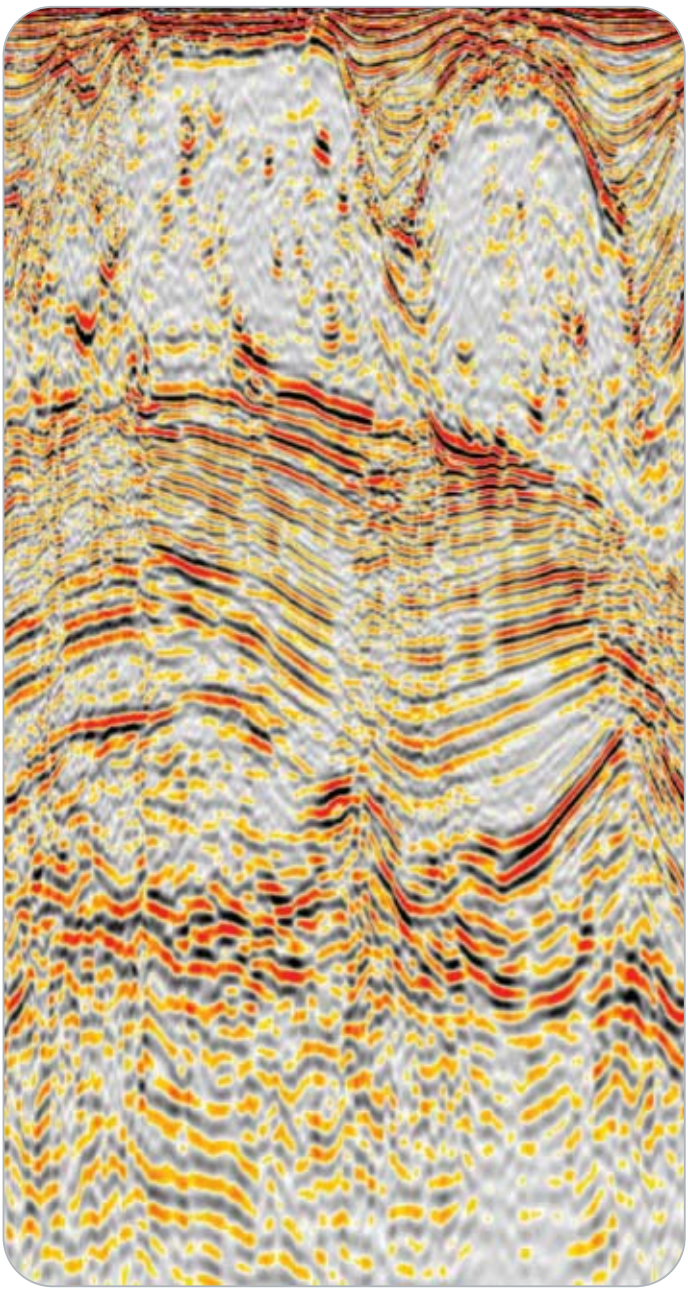
These basins contain a series of smaller, complex subbasins. The structural style identified in these basins displays good potential for the development of multiple hydrocarbons traps with widespread evidence of folding, faulting, and complex fault thrusts.

The Central Depression covers most of the joint venture's license area and

Walker Ridge Jack/Julia Discoveries Narrow Azimuth



Walker Ridge Jack/Julia Discoveries Fast-Trax Wide Azimuth



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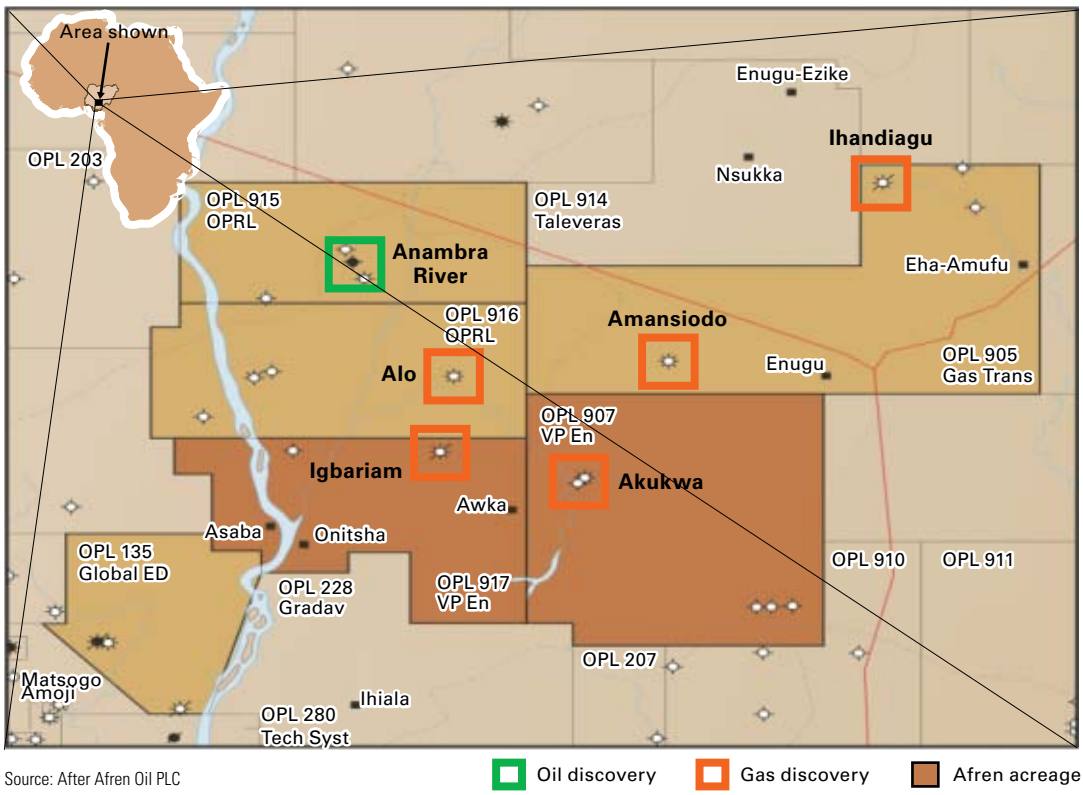
DISCOVERIES IN NIGERIA'S ANAMBRA BASIN

Fig. 2



Source: After Afren Oil PLC

contains a broad age range of sediments from the oldest Devonian era sequences up to thick recent sediments. This broad sequence offers the potential for the development of various reservoir, source, and seal combinations.

In southernmost Block 6, near the Iran border, a Jurassic-Cretaceous subbasin is virtually unexplored and may offer large hydrocarbon potential, Blackstairs said.

Previous hydrocarbon exploration has been patchy and unsystematic and undertaken using fairly basic geological and geophysical techniques, Sheehan said. From 1947 to 1990, the former Soviet authorities undertook fairly sporadic programs of seismic and drilling, often lacking in geological and adequate seismic control.

Two key well results emerged from this phase of exploration. The Shorakhpur-1P well east of the capital Yerevan encountered minor oil. Farther west at Armvir the Oktemberyan-13E well flowed gas at low rates for 6 months.

Numerous other boreholes encountered indications of both oil and gas, and several oil and gas seeps scattered widely throughout the license area are well documented.

This phase was followed in the 1990s by a seismic and drilling campaign by Armenian American Exploration Co. Its Azat-1 well went to 3,524 m and encountered minor oil shows before being terminated for operational reasons.

Transeuro Energy Corp. drilled the Kamir-1 exploration well in 2007 and reported an extensive reservoir interval with well logs indicating a thick zone of low gas saturation. Transeuro also reported that this well has been suspended until more logging and testing can be carried out later in 2008.

Blackstairs-Vangold said the exploration programs to date "offer sufficient encouragement to infer the development of a working petroleum system. However, a more systematic geological and geophysical evaluation program is required to advance our understanding of the hydrocarbon prospectivity."

The joint venture is developing a new geological model for the area. Historical data are being carefully analyzed and incorporated to a modern GIS database and "are already yielding valuable geological information and greatly assisting in the evolution of a new geological model for the area," Blackstairs said.

In order to understand the major controls on structure formation and sedimentation, a high-resolution satellite remote sensing study was completed in 2007. This is being followed up with more focused evaluation of certain areas highlighted from the initial phase, and field validation of newly identified geological trends is progressing.

A 5,000-station gravity survey on blocks 4 and 5 began in 2007 and is to resume in early summer 2008. This will serve to elucidate the subsurface structural trends and will be integrated with the satellite imagery and field structural and geological mapping.

"The ultimate objective of these studies," Blackstairs said, "is to highlight areas for a focused program of 2D seismic acquisition targeted at significant structural trends in promising fairways for reservoir, seal, source rock, and migration route development. Ultimately the joint venture aims to assemble a good quality prospect portfolio and rank these individually for a future drilling campaign."

Anambra basin, Nigeria

A joint venture of Afren PLC and Global Energy Co. Ltd. of Nigeria plans drilling in 2009 to appraise decades-old gas-condensate and gas and oil discoveries in Nigeria's nonproducing Anambra basin (Fig. 2).

The company refers to Anambra as Nigeria's second most prospective basin. The OPL 907 and 917 total 3,500 sq km.

The partnership of Afren Global Energy Resources became operator of and took 41% interest in OPL 907 and 42% interest in OPL 917 in the underexplored basin. The Anambra basin, with a gas resource estimated at more than 5 tcf, has 30 wells and six discoveries.

On OPL 907 the group will evaluate existing data, shoot 1,000 km of 2D seismic, and drill one or more appraisal wells near the Akukwa discovery.

Shell drilled four shallow core holes before Shell and British Petroleum discovered Akukwa in 1955 and drilling Akukwa-2 in 1956. Akukwa has estimated gas in place of up to 400 bcf.

The other participants in OPL 907 are Buston Energy Resources Ltd. 25%, Allenne Exploration & Production Ltd. 14%, Bepta Oil & Gas Ltd. 10%, Kaztec Engineering Ltd. 5%, VP Energy Ltd. 3%, and De Atai Oil Services International Ltd. 2%.

On OPL 917 a different group will evaluate existing data, shoot 2D seismic over the 1971 Igbariam discovery, and identify leads and prospects before drilling appraising Igbariam.

Shell and BP's Igbariam-1 encountered a reported 196-ft net gas column and a 30-ft condensate-oil column in Cretaceous sandstones. The well was not tested. The 1972 Ajire-1 well was water wet.

Besides Afren Global, OPL 917 participants are Petrolog Oil & Gas Ltd. 18%, VP Energy 17%, Goland Petroleum Development Co. Ltd. 13%, and De Atai Oil Services 10%.

Takutu basin, Guyana

A farmout agreement signed in March 2008 could lead to drilling around the end of the year in southern Guyana's Takutu basin.

Groundstar Resources Ltd., Vancouver, BC, and a company it did not name signed the agreement relating to the company's petroleum prospecting license.

The farmee is to pay 100% of exploration expenses up to $12 million to earn 55% working interest in the block. It also has the option to hike its working interest to 65% by July 22 by issuing to Groundstar $1 million (Can.) worth of its securities.

Groundstar has three large seismically defined prospects on the license. The Karanambo-1 exploration well drilled by Home Oil Ltd. in 1982 tested 411 b/d of 42° gravity oil without water on a 5-hr drillstem test, which proved that the basin has the essential elements of a petroleum system. The well was never placed on production.

The farmout is expected to lead to the drilling of at least two exploratory wells.

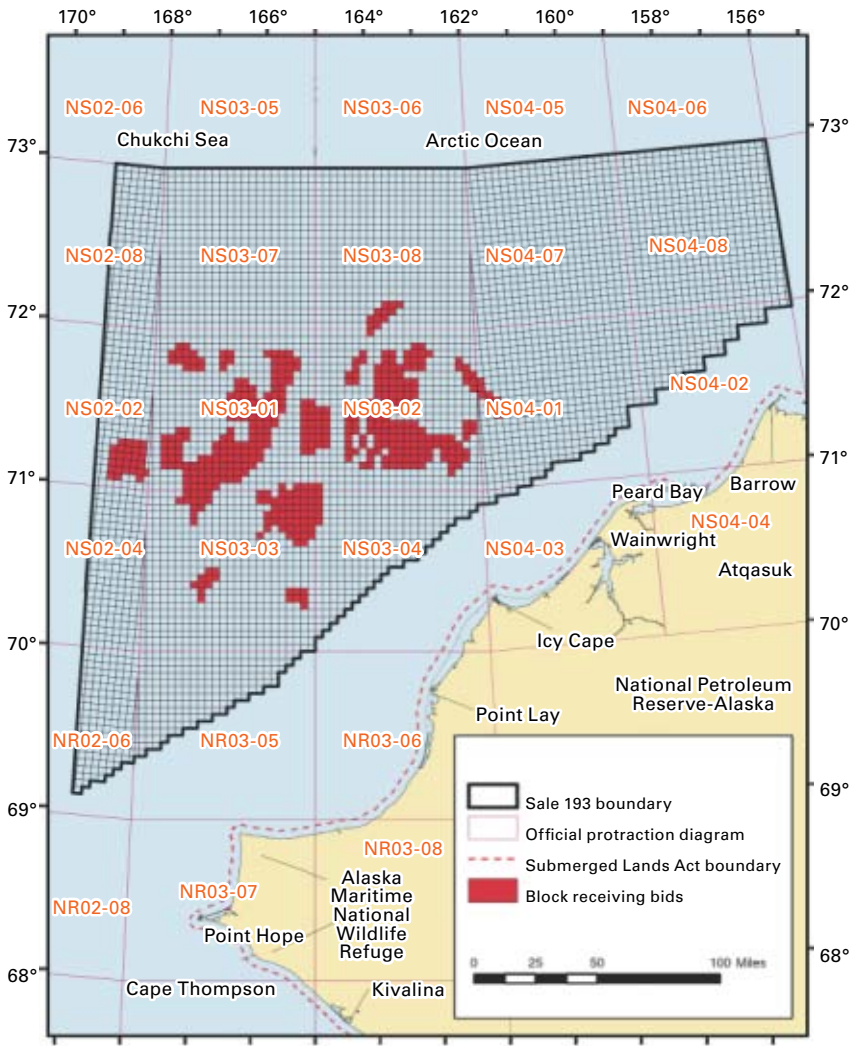
The fiscal terms of the PPL are very favorable. Groundstar signed the four-year license in 2005.

Tamarugal basin, Chile

March Resources Corp., Calgary, said last month that its Pica-1 wildcat in the nonproducing Tamarugal basin in

WHERE INDUSTRY BID FOR CHUKCHI BASIN ACREAGE

Fig. 3



Source: US Minerals Management Service

northernmost Chile cut 500 m of gas-charged volcanic tuff and sand intervals in the upper section of the well.

March noted that at the time the well had not yet reached its main gas targets, which were expected at 2,800-3,300 m. It also cautioned that despite the favorable results, the well cannot be considered commercial until tests are conducted.

The company later cased the well to TD just below 3,100 m and said it plans to perforate 12 to 17 prospective zones.

March said, "Several controlled gas kicks have been observed at surface during drilling breaks, in what is anticipated to be fractured rock.

"The samples taken from a depth of 900 m to 1,550 m have had mud gas isotope analyses conducted on them in an independent lab in North America. The hydrocarbon gas composition results indicate that the gases sampled to date have a high percentage of methane but also include varying percentages of ethane, propane and traces of condensate."

Cuttings analysis indicated that the zones "consist of varying amounts of volcanic tuff and orthoquartzite, tight volcanic sands that appear to have varying fracture concentrations at various depths. This type of volcanic sand has shown very strong production results in other areas of the world, as it typically responds favorably to mechanical fracturing."

March said the main target in the well is a "thrust zone that cuts vertically through any existing black shales in the hanging wall or the footwall of this structure. The black shales are considered to be the source rock in this basin. The surface expression of this thrust has a north-south extension of approximately 30 km, which was seen in the original 2D seismic lines previously shot."

It explained that this is the type of structure that exists in the overthrust belts of Canada and Montana-Wyoming, as well as the known structural formations in the Neuquen basin of Argentina and the Llanos basin of Colombia.

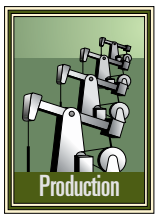
The company plans to spud the Pica-2 well shortly.

Chukchi basin, Alaska

The US Minerals Management Service is evaluating the more than $2.6 billion in high bids offered Feb. 6 for leases in the Chukchi basin off northwestern Alaska (Fig. 3).

Industry submitted a total of 67 bids for 448 blocks in the area of more than 29 million acres where only five exploration wells have been drilled previously. Previous leasing was in 1988 and 1991.

The leases offered extend from 25-50 miles to 200 miles offshore, but the closest tract that drew a bid is 54 miles off the coast. ✦



POINT OF VIEW

Unexploited oil resources continue to attract technology innovations

Guntis Moritis
Production Editor

Over the years the oil industry has developed many technologies for improving oil recovery, yet much unexploited oil still remains in the ground. For instance, a US Department of Energy estimate made in the early 2000s says that the US has 407 billion bbl of remaining discovered resource that lie dormant (Fig. 1).

The US government has stopped most funding for research or demonstration projects for developing new ways for recovering these resources.

The government funding that remains is mainly through the Energy Policy Act of 2005. The act set up the public-private Research Partnership to Secure Energy for America (RPSEA) that has $50 million of funding provided from a US royalty fund. RPSEA's primary focus is on research projects for recovering offshore oil and gas and unconventional gas and not for enhanced oil recovery.

DOE's National Energy Technology Laboratory administers the RPSEA projects and also has access to 25% of the funding for projects such as methane hydrate research.

DOE also contributes to the biennial Society of Petroleum Engineers/DOE Improved Oil Recovery Symposium in Tulsa. This year's event will be held on Apr. 19-23 at Tulsa's Renaissance Hotel and Convention Center.

IOR-EOR technologies

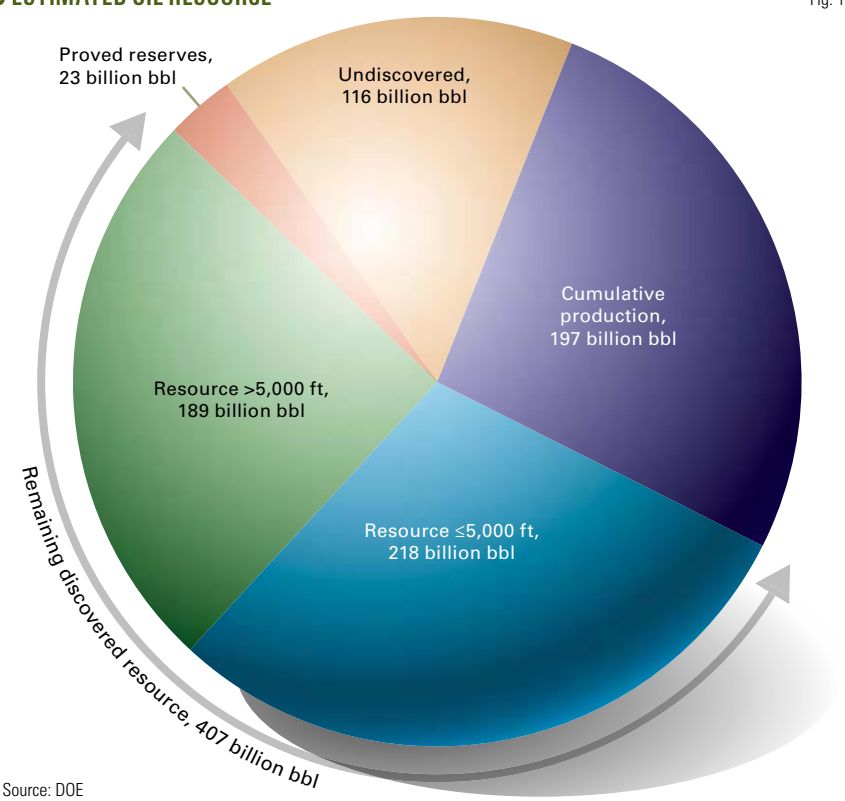
Bill Lawson, chair of this year's IOR symposium, said the 2008 edition of the biennial symposium promises to be the biggest and best in years.

Lawson retired in 2006 as director of the Strategic Center for Natural Gas & Oil at DOE's National Energy Technology Laboratory. He currently is the director of technology commercialization at the University of Tulsa.

Lawson noted, "The symposium's theme reflects the shrinking base of new field discoveries, as well as the mounting number of maturing fields

US ESTIMATED OIL RESOURCE

Fig. 1



Source: DOE

Career highlights

William F. (Bill) Lawson became the director of technology commercialization at the University of Tulsa in September 2007, where he champions the identification, development, and marketing of the university's intellectual property. He is also engaged in consulting on energy and management issues through his Tulsa-based company, Mountaineer International LLC. Lawson worked for more than 31 years with the US Department of Energy, most recently as the Director of the Strategic Center for Natural Gas and Oil at the National Energy Technology Laboratory from 2002 until his retirement in January 2006. There he oversaw the natural gas and oil research and development implementation activities for DOE's Office of Fossil Energy. During 1998-2002, he served as Director of DOE's National Petroleum Technology Office in Tulsa.

Education

Lawson has a degree in applied physics from West Virginia University.

Organizations

Lawson is chair (2007-10) and Oklahoma delegate to the energy resources and technology committee of the Interstate Oil and Gas Compact Commission. He also is general chair of the 2008 SPE/DOE Improved Oil Recovery Symposium. Lawson is a member of SPE and AAPG.

worldwide. Together with sustained high oil prices, national policy changes in some oil-producing countries in managing and producing their own resource, and the consequential migration of multinational oil companies to greater participation in more-mature fields have again increased the focus on secondary and tertiary oil recovery technologies and practices worldwide."

He also noted that "Detailed reservoir knowledge available today allows companies to develop fields with greater confidence." For instance, he said that in the US early attempts with chemical flooding were partly driven by tax credits that led to injecting various "witches' brews." But now the industry has the technology and knowledge to characterizing reservoirs more precisely and delineate the heterogeneities that are much more pronounced than previously believed, he added.

Controlling water flow from reservoirs is one of the major aspects of IOR and is featured at the Tulsa symposium, he said. Lawson added that another event at the symposium is a session on surfactants and polymers that will highlight the efforts in China's Daqing oil field, which is said to be the "world's largest field experiment in IOR/EOR."

As far as EOR, Lawson noted such technologies as injecting CO_2 hold potential for increasing recoveries but in the US CO_2 availability is limited and currently there are no economic incentives for industries, such as power plants, to capture CO_2.

He estimated that captured CO_2 from industrial sites would need a sales price in the range of $1-1.50/Mscf to make it economical for EOR projects. But without carbon tax schemes and cap-and-trade legislation that would provide incentives for CO_2 capture, captured CO_2 availability for EOR is not on the horizon, he noted.

Power plants that use coal gasification technology could provide CO_2 at lower costs because the CO_2 already is at higher pressure and is more readily separated than at conventional coal power plants. But Lawson said that he knows of no firm plans in the US for building such plants in areas close enough to oil fields that could use the CO_2 for EOR.

Because of escalating costs of such plants, the US government also has abandoned its plans to build the FutureGen coal gasification demonstration plant.

"Detailed reservoir knowledge available today allows companies to develop fields with greater confidence."
William F. Lawson

People

Although new technologies continue to provide new ways to extract additional oil, Lawson said that the lack of qualified people to do the work remains a major impediment for implementing the technology.

Also he added that he feared much knowledge from earlier studies and work may have been lost because of the reduction in the workforce during the last few decades. ✦

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Shell China Exploration & Production Co.
Beijing

The Changbei field area in the Ordos plateau, at the southern tip of the Gobi Desert, is twice the size of Beijing city and expected to supply dry methane to Beijing for the Olympic Games that begin Aug. 8, 2008.

Shell drilled the first of the dual lateral horizontal wells in 230 days, but the most recent took only 186 days. In 2½ years of operations, Shell has refined and optimized the drilling process, but the Changbei project still faces contractual gas deliveries for 2008. This requires completing at least six additional dual lateral wells this year. Because Shell and its partner PetroChina are the first to drill and operate this type of well in China, there are no benchmarks to follow and the steep learning curve continues.

New ways of working

The project started out with two new and one 4-year old Series 7 rigs (capable of drilling 7 km) built by two Chinese corporations: Baoji Oilfield Machinery Co. Ltd., in Shaanxi Province, and Lanzhou, in Gansu Province. It seemed at first that most of the Chinese rigs were working for Great Wall Drilling Co. In fact, this company is an agency that looks for projects outside China and then farms them out among Chinese companies such as Changqing Petroleum Exploration Bureau and Liaoche Petroleum Exploration Bureau. Each rig has a unique number (such as 70156), which indicates the rig capabilities, age, and even where it has been drilling. This helps the technical evaluation during tendering for rigs.

Contracting rigs is a unique experience in China, where the custom is to negotiate after the signing as to what the specifications, in fact, mean. Chinese drilling companies tend to be compartmentalized into various departments, each separately managed. For example, a drilling contractor will have a materials department that lends it the equipment, a financial or purchasing department that supplies spare parts, a transport department for the rig move, and so on. The friction that can arise between departments is not transparent to outsiders.

In addition, the companies' somewhat rigid hierarchy creates safety risks because each department's own safety culture can be different from that of the drilling contractor on site. Often the drilling contractor needs to smooth the path before a service is needed.

Wells

The Changbei wells are dual laterals; both legs are drilled to about 5,400 m, demanding a high degree of accuracy because the pay zone is thin. The clay formations of the Ordos plateau are hard and the reservoir sands abrasive. This makes the Changbei wells capital intensive, even though the rigs are probably among the cheapest of their kind at present.

Some equipment is starting to show wear 2½ years into the project, due to harsh drilling conditions, substandard maintenance, procedures, and gear. This is especially true of drill pipe strings. Frequently, drill pipe boxes split and wash out, resulting in fishing jobs and scrapped pipe. Shell formed a special team to identify the causes and rectify the problems. So far it has become clear that the pipe handling is not good and the locally sourced power tongs used to make up the drill pipe cause deep stress initiation grooves on the high torque tool joints.

Quality

This illustrates the struggle that Shell faces when it comes to delivering high-quality wells. Each of the new horizontal wells costs about four times the cost of a vertically drilled and hydraulically fractured well common in this part of China. Shell has to prove the horizontal well technology and at the same time find a delicate balance between cost and quality to defend the right to be working here.

The cost-quality ratio is present in every aspect of daily drilling and completion work. For example, a local

Shell is drilling in Changbei's semidesert environment (Fig. 1).

The Changbei Wells project unites two technical cultures (Fig. 2).

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Changbei Rig 1 worked through rare snowfalls (Fig. 3).

Roughnecks rack back 5½-in. drill pipe (Fig. 4).

wireline crew will consist of 11 people, each with assigned tasks, be it driving the truck or making up chicksans. A cement crew consists normally of as many as 20 people. The availability of such large crews often means that the preventive maintenance traditionally done in the yard is replaced by corrective maintenance done at the wellsite.

Hierarchy

The hierarchy within Chinese drilling companies sets them apart from operations in other parts of the world. Team consensus through meetings may be the norm for western companies, but the Chinese way of working is based on commands through the line. This sometimes leads to hidden shortcomings in operations due to the fear of retributions from further up the line.

The example of "correct" reporting is appropriate, in which many parameters such as mud properties, spare part inventories, and equipment data are always reported within the planned window of values. Making assumptions or troubleshooting based on those kinds of information can lead to wrong and often costly decisions. For example, Chinese equipment does not always have all the correct specifications.

Chinese drilling contractors generally like to buy foreign drilling equipment, rather than to rent it. They perceive that contracts to service this equipment are too expensive, so the crews on the rigs do the maintenance themselves. The drawback is that carrying out repairs and getting spare parts are more cumbersome at times. Shell and the drilling contractors together have set up a successful preventative maintenance system (PMS) that is paying off now. The systems have been earmarked for use on more Chinese rigs elsewhere.

The project uses the newest Halliburton rotary steerable tools on a Geoforce motor, which allows a faster buildup section in the 12¼-in., with PDC bits, rather than rock bits. It is this cost-quality ratio that Shell aims to achieve in its operations to deliver the next six wells before the end of this Chinese year in order to fulfil the gas target.

The 2007-08 winter will be the harshest in China in more than half a century. Although it is too cold and dry in Yulin to have a lot of snowfall, rig winterization is key to be able to operate year round. Avoiding nonproductive time (NPT)is essential during long periods when temperatures dip down to –30°. Logistics during this winter and with CNY have been complicated as heavy snowfall has forced road closures. The wind over the plateau adds to the chill factor.

Drilling crews work normally 9 months on the rig and are off for the rest of the year, when the rig goes idle over winter. The length of wells make it necessary to drill year round; crews are on 5-week rotations in Changbei. Therefore, there is no local experience to run the winterization package optimally, although the team has been able to avoid large NPT events with the right amount of boilers, heaters, and operational changes.

From the start, Shell made it priority to increase the Chinese content of the Wells team. Mature hires, graduate hires, and in particular, Petrochina seconded staff, have benefited from becoming familiar with international operational standards in drilling and well-service technologies.

Since the start of the development program in fourth-quarter 2006, 33 staff (Chinese nationals and expatriates combined) were provided with Shell Wells' distance-learning package. Through the end of January 2008, 15 staff members (13 Chinese nationals) had successfully completed Round 1, of which 9 members (7 Chinese nationals, including PetroChina seconded staff) have completed the Round 1 exam. Excellent performance, combined with satisfactory results in passing the R1 exams, made it possible to promote a few experienced Chinese wellsite staff from night to day supervisory positions.

If the pace of self-study and dedication to become a competent Wells staff member continues, one can reasonably expect 13 staff to obtain an R2 pass by mid-2009. This would permit a healthy

CHANGBEI FIELD SNAPSHOT

Location:	Ordos basin, Gobi desert, 1,200 m elevation
Field size:	1,588 sq km
Temperature range:	+50° C. to –40° C.
Drilling fleet:	Three Series 7 rigs from Baoji and Lanzhou
Onsite work force:	Almost 2,000
Wells:	Long, dual lateral horizontal completions
Partners:	PetroChina, Shell China

and justifiable progression of junior staff to senior positions, thus reducing the expatriate content of the team, as intended.

Progress, milestones

After the Changbei field has been operating for more than 2 years, only eight wells have been completed. Even so, Shell's partner, Petrochina, believes that many milestones have been achieved. The first and foremost is a large advancement in technology.

Drilling the longest horizontal wells in China in both 8-in. and 6-in. hole sizes is substantiating that Changbei field-development plans are correct. Out of these wells, six have a higher than planned initial and continuous production, proving that reservoir impairment has been prevented, even though the sands are generally tight and low pressured.

The second milestone is in HSE performance. Only two minor lost-time incidents have occurred. Both PetroChina and Shell intend to reach this year's safety target for the Changbei project. PetroChina is confident that if the new learning curve can be achieved the contractual target can be met. It can use the technical and HSE expertise well in its other operations.

Drilling obstacles, solutions

Generally, Chinese drilling contractors are unfamiliar with the concept of NPT and key performance indicators. Because the mother company decides which rig and operation has precedence, if a rig has to wait, it is accepted. Most Chinese rigs are contracted on a lump sum basis. A contractor will get paid only after reaching an agreed depth in the well or hole section.

Changbei contractors initially liked the daily rig rate because even when operations had delays due to mechanical issues they still got paid. There were no discussions concerning the final monthly billing sheets. This changed rapidly after they realized that the total of rig rate and standby rate could quickly be consumed and change into a zero rate with increasing downtime.

SCEPCO is now actively working with the contractors and moving to a win-win midpoint with an incentive structure, based on overall actual vs. planned well timings. Given the mix of languages, practices, and cultures, communication can be a major problem. To get to the bottom of things one has to be very precise and ask only open questions—ones that can not be answered with a simple yes or no.

Chinese drilling companies do not work with the concept of a tool pusher. Rig supervisory staff include a drilling engineer and a rig manager. Most of


Chinese driller works a Changbei rig for the Shell project (Fig. 5).


Water reservoir in local village was installed with help from the Changbei project team (Fig. 6).

the time, the DE and RM are the best educated, but often lack rig floor experience. For the Changbei project, tool pushers have been appointed, but the modus operandi at other Shell locations has to be carefully revised to prevent shortcomings in communications and hence operations.

By far the largest factor for lost time in the wells has been problems in drilling the bottom of the 12¼-in. section. The formations in the Shanxi are hard mud and clay stones, interbedded with fragile coal seams. These seams can fail, causing large, hard cavings to fill the wellbore and resulting in stuck pipe and mud motor failures due to large bending stresses over washed-out sections. The team has come up with special procedures and BHA configurations to avoid these events and improve ROP. Currently, there is a drive to optimize the use of PDC bits and minimize sliding with mud motors.

The regional team of experts in Miri, Malaysia, together with two mud specialists in the field have come up with an improved KCl-based drilling fluid that is currently being tried. This is key to avoid losses in the upper Liujjiagou formation while preventing large cavings in the Shanxi formation and retaining a contingency to clean the wellbore in case cavings occur. The mud is pretreated with various lost-circulation materials. All these measures increase the chances the drillers will get the long 9⅝-in. production casing into the Shanxi pay zone.

Lately, more liners have had to be dropped off in the openhole reservoir holes to stabilize (carbonaceous) shales that can collapse during production. So far, all 7-in. and 4½-in. perforated liners have been successfully installed. Also, due to unexpected subsurface conditions, it has been necessary to install intermediate 7-in. cemented liners. Drilling the subsequent 6-in. section required special attention to torque and drag, but good progress has been made to get to an acceptable drainage-leg length of 1,900 m.

Drilling such lengths of 6-in. annulus is only possible by using stiffer 4-in. (heavy weight) drill pipe. Staff at the real time operating center (RTOC) in Miri aid the directional drillers and drilling supervisors by modeling the optimal bottomhole assembly and pipe configurations. A contracted bit specialist in the operations team has been working on improving the 6-in. rock bit design for longer bit runs.

Where the 8½-in. bits experience considerable gauge wear, the 6-in. bits normally have bearings fail before the bit reaches the end of its useful life. All these iterations have resulted in a slimmed-down well design as a viable option for the future and a dependable contingency when dealing with unstable shales in the reservoir sands.

Learning curve

Shell worldwide is working to implement LEAN-SIGMA improvement methodology that complements Shell's drilling-the-limit tools. LEAN is more a philosophy and a toolbox to analyze and improve drilling than the in-house process that DTL used to be. The LEAN approach comes from the automotive and production industry, having been successfully developed by companies like Toyota and General Electric. But, how do boreholes 3 km underground compare to making 2,000 cars or 5,000 electric razors each day?

It's not the reduction of statistical failure and waste-products that Shell is after; it's the mapping of drilling processes and the identification of nonvalue-added steps and wasted time that help to improve delivery of wells and reduction in failure events. DMAIC involves: Making detailed process maps (Defining) and timing the steps (Measuring), looking carefully at the value and problems of each step (Analyzing), learning from good or bad practices (Implementing), and sharing the results (Controlling) to achieve better and more uniform performance.

Drilling rigs are run by people, not robots, all with different ideas and experiences on how best to drill the well and prevent train wrecks. The LEAN process helps to capture the best efforts and practices worth duplicating and makes them visible for others to improve, especially between departments. Successful LEAN projects currently under way in the Changbei project include 6-in. hole drilling, tripping, casing running, and moving rigs, but the first success story of a LEAN implementation was the tie-in of Changbei wells. Previously it took around 40 days from the rig having left a cluster to first gas; now

it takes 14 days. This achievement has been realized by better scheduling and safe, concurrent operations by the wells, well services, engineering, and operations teams.

The LEAN process has facilitated communications and eliminated misunderstandings. It is a commendable effort, realizing that it takes 150 truckloads to move a rig, every well has to be lifted with coiled tubing and nitrogen and cleaned up via temporary pipe work to a flare pit for about 5 days, tied into the cluster facilities with other wells already on-stream, and then introduced to the central production facilities. Efforts are ongoing to realize the next step in the process, in which new wells are cleaned up directly at the facilities, negating the need for the results of production testing to enter the atmosphere.

Because logging while drilling is not cost effective, Shell has always conducted borehole evaluation as a separate run by pumping and rotating out of hole. Recently, Shell has successfully introduced shuttle logging, in which smaller tools are brought to depth efficiently inside drill pipe, then pumped out and pulled back to surface without having to pump through the string. This process has saved about 2 days/leg since its introduction.

Further improvements towards the goal of 160-day wells have been achieved with the use of agitators and variable gauge stabilizers (AGS) for both 12¼-in. and 8½-in. holes. Because depth control is much stricter than the lateral control, an AGS sub is effective in improving the rotary vs. sliding ratio. Sliding at depth is harder to manage and thus results in lower penetration rates. Using the agitator has been proven to promote the weight transfer to the bit and, as such, helps with a steady tool face in case sliding is required. With all of these efforts the team is confident it can achieve good results.

Last summer, a 17-member electric line crew deployed a tractor-conveyed PLT string over a lateral junction to evaluate the contribution of each leg in a well that had yielded disappointing results. The next step in our technology staircase will be to introduce a capacitance array tool to better understand the reservoir inflow mechanism of the Changbei wells.

As of February 2008, the three rigs in Changbei had achieved more than 1,050 days without incident in the middle of the Gobi Desert.

Record leg

In October 2007, the longest horizontally drilled leg was superseded again by the drilling of CB3-2 leg 1 to a length of 2,251 m, proving that it is possible to drill such lengths in abrasive narrow sandstones with water-based mud.

Acknowledgment

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Study examines production of near-zero sulfur FCC gasoline

Dicho Stratiev
Todor Tzingov
Georgi Argirov
Ivelina Shishkova
Lukoil Neftochim Bourgas
Bourgas, Bulgaria

This article examines the feasibility of producing near-zero sulfur FCC gasoline by FCC feed pretreatment and gasoline posttreatment. The transition to 10 from 50 ppm sulfur in the FCC gasoline using feed pretreatment drastically shortens the cycle length and significantly increases the cost for production of near-zero sulfur gasoline.

A possible way to cut costs is to fractionate full-range FCC gasoline into two fractions: initial boiling point (IBP) to 140° C. and 140° C. to final boiling point (FBP) and hydrotreat the heavy fraction. Refiners, however, should perform the fractionation by undercutting the FCC gasoline in the main fractionator and then distill the heavy gasoline from the light cycle oil (LCO) in a separate column.

If the fractionation is performed on the full-range FCC gasoline, the operating cost is too high and posttreatment becomes unattractive economically. Revamping the FCC pretreater to increase the catalyst volume offers the best economics regardless of the relatively higher capital expenditure.

FCC sulfur

In accordance with European Union Directive 2003/17/EC, sulfur in automotive gasoline must be lower than 10 ppm starting Jan. 1, 2009. FCC gasoline contains about 90% of the sulfur in the finished gasoline pool. This is why the main technologies to reduce gasoline sulfur content are those that desulfurize FCC gasoline.[1]

Two methods are used to reduce sulfur in FCC gasoline—FCC feed pretreatment and FCC gasoline posttreatment. FCC feed pretreatment technologies due to catalyst developments allow the attainment of ultralow-sulfur levels (50 ppm) in the FCC gasoline without requiring a unit revamp.[2]

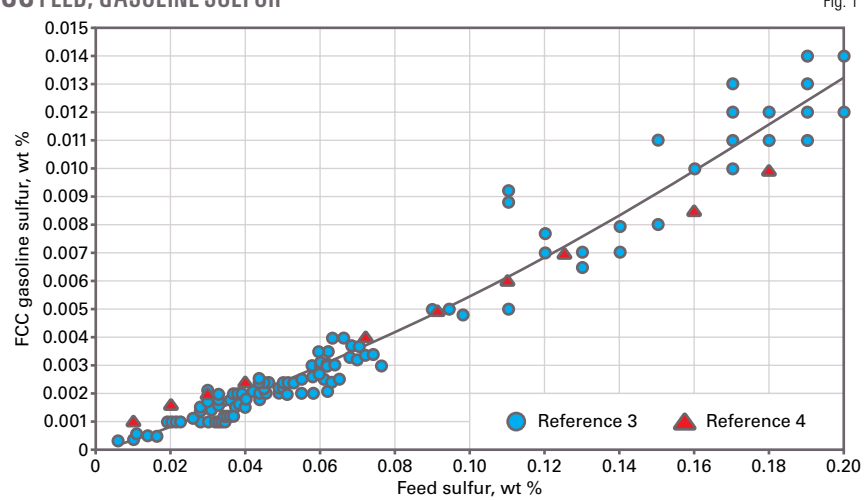
Sulfur less than 10 ppm (near-zero sulfur) is difficult, however, for FCC pretreating units. It is hard to achieve without increasing the catalyst volume; otherwise the cycle length would be unacceptably lower.

Fig. 1 shows the relationship between FCC gasoline sulfur and FCC feed sulfur from two independent sources.[3 4] These data show that attaining 10-ppm sulfur in the FCC gasoline requires an FCC feed sulfur level of 100-200 ppm.

On the basis of results from the Lukoil Neftochim Bulgaria (LNB) FCC pretreating unit using a Haldor-Topsoe TK-558 Brim catalyst,[5] we estimated the expected cycle length at a liquid hourly space velocity of 1.2 hr^{-1} and an end-of-

FCC FEED, GASOLINE SULFUR

Fig. 1



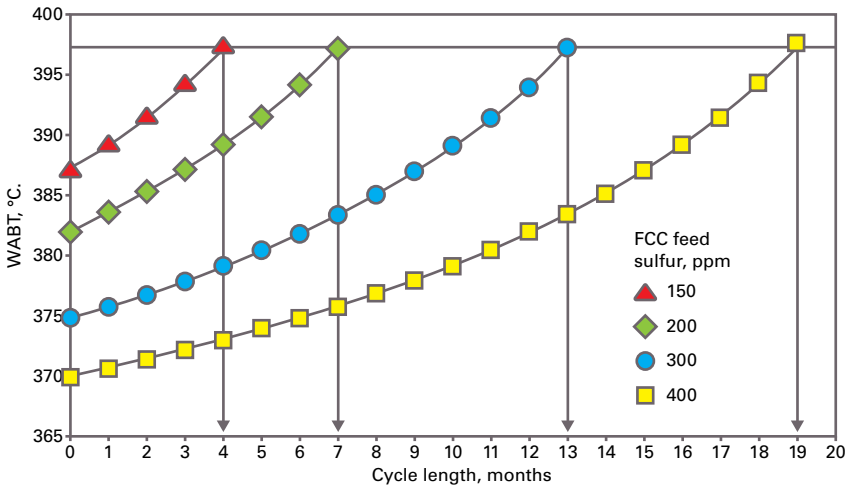
run weighted average bed temperature (WABT) of 398° C. (Fig. 2).

Fig. 2 shows that 150-ppm sulfur in the FCC feed is possible for no longer than 4 months and 200 ppm for 7 months. Such short cycle lengths are difficult to justify economically.

A longer cycle length would require a revamp to increase the catalyst volume. For example, the estimated required catalyst volume to achieve an 18-month cycle length is 92% more than the existing volume.

We therefore investigated the feasibility of combining pretreatment and posttreatment technologies to attain sulfur levels in the FCC gasoline of less than 10 ppm with the aim to find an optimum solution.

FCC CYCLE LENGTHS Fig. 2



Experimental

A sample of FCC gasoline from the LNB FCC unit was distilled into four fractions in an apparatus in accordance with ASTM D-86:

- IBP-100° C.
- 100-120° C.
- 120-140° C.
- 140° C.-FBP.

Table 1 shows the content of these fractions in the whole FCC gasoline sample along with the sulfur and olefins content. Another sample of FCC gasoline was fractionated in a TBP Fischer Autodest 800 AC column at atmospheric pressure in accordance with ASTM D-2892. The sample was separated into light and heavy gasoline with different fractionation ranges: IBP-100° C and 100° C.-FBP, and IBP-140° C. and 140° C.-FBP, respectively.

The efficiency of the rectification column packing was equivalent to 15 theoretical plates. The reflux ratio was 5. The yields of heavy gasoline were 30% in the 100° C.-FBP fraction and 15% in the 140° C.-FBP fraction. During the rectification, we recorded losses of 13%, which we considered as part of the light gasoline fraction.

Table 2 shows the physical and chemical properties of the whole FCC gasoline sample and the distilled light and heavy gasoline fractions.

Hydrotreating both heavy FCC gasoline fractions occurred on the Topsoe TK-576 BRIM catalyst in a trickle bed pilot-plant at these conditions:

- Reactor inlet temperature, 280° C.
- Liquid hourly space velocity, 2 hr^{-1}.
- Reactor total pressure, 3.5 MPa
- Hydrogen containing gas-feed ratio, 200 N cu m/cu m
- Hydrogen in treating gas, 99 vol %.

Reference 6 shows the processing procedure.

Results

Full-range FCC gasoline hydrotreatment leads to a significant reduction in octane number.[7,8] That is why we distilled the FCC gasoline in different fractions—to know the sulfur and higher olefins distribution.

Table 1 shows that 60% of the sulfur is in the fraction boiling greater than 140° C. and only 2% of total FCC gasoline olefins is in that fraction. Lowering the IBP of the heavy gasoline increases the high-octane olefins content and, therefore, during hydrotreatment, a greater loss of octane is expected. We therefore distilled the FCC gasoline into fractions greater than and less than 140° C. to keep the heavy gasoline's octane number as high as possible.

To discover the effect of fractionation cut point on octane loss during heavy gasoline hydrotreatment, we also fractionated the full-range FCC gasoline into fractions boiling at greater than and less than 100° C.

Table 3 summarizes the detailed hydrocarbon composition of the heavy FCC gasoline fractions before and after hydrotreatment.

FCC GASOLINE Table 1

Fraction	Distillation, ASTM D-86 vol %	wt %	Sulfur ppm (vol)	ppm (wt)	Accumulated sulfur ppm (vol)	ppm (wt)	Sulfur relative to full-range FCC gasoline total sulfur, %	Olefins, wt %	Accumulated olefins, wt %	Olefins relative to total full-range FCC gasoline olefins, %
IBP-100° C.	55.7	51.4	10	14.9	5.6	7.6	20.8	40.3	20.7	57.6
100-120° C.	11.3	12.2	19	24.3	7.7	10.6	28.8	20	23.1	28.6
120-140° C.	9.3	10.4	27	33.1	10.2	14.0	38.1	8.2	24.0	11.7
140° C.-FBP	23.7	26.1	70	87.4	26.8	36.8	100	1.5	24.4	2.1

FULL-RANGE FCC GASOLINE, DISTILLED FRACTIONS

Table 2

	Full-range FCC gasoline	Light FCC gasoline		Heavy FCC gasoline	
Fraction analysis, wt %		**IBP-140° C.**	**IBP-100° C.**	**140° C.-FBP**	**100° C.-FBP**
n-Paraffins	4.0	4.2	4.5	1.6	2.4
i-Paraffins	28.8	30.5	35.6	9.5	16.2
Olefins	25.1	26.1	32.0	1.6	5.2
Naphthenes	7.9	10.2	9.7	2.5	6.6
Aromatics	29.9	24.1	13.6	73.5	61.4
Unidentified	4.3	4.9	4.5	11.3	8.2
Volume fraction, vol %		Boiling points, ASTM D-86 distillation, °C.			
Initial boiling point	40	43	37	112	93
5	51	55	46	152	115
10	55	59	49	156	122
20	61	66	53	163	130
30	68	74	57	169	137
40	82	83	62	173	145
50	96	94	69	178	152
60	112	104	77	183	158
70	130	118	86	189	167
80	150	130	97	195	176
90	170	145	117	205	188
Final boiling point	204	175	159	228	217
Recovery, vol %	97	97	98	97	98
Specific gravity, d^4_{20}	0.7389	0.7289	0.6969	0.8484	0.8196
Sulfur, ppm	44	24	15	160	112
RON	93.3	92	92.1	95	93.2
MON	81.6	80.7	81.2	85.3	82.4

These data indicate that hydrotreatment reduces the sulfur level to less than 1 ppm but also leads to saturation of 80% of olefins and 3% of aromatics. Due to hydrotreatment, the content of paraffins and naphthenes in the hydrotreated heavy gasoline increased compared with the unhydrotreated gasoline.

Hydrotreating also resulted in octane losses of about 4 points (RON and MON) in the 140° C.-FBP fraction and of 5.9 RON and 3.2 MON in the 100° C.-FBP fraction. The octane number of all of the blended FCC unhydrotreated gasoline fractions was about 1 point lower than that of the starting full-range FCC gasoline.

This could be due to losses of about 13% of the light gasoline registered during fractionation of the full-range FCC gasoline in the Fischer Autodest 800 AC column. We therefore evaluated the octane loss of the full FCC gasoline based on the octane of the blended light and heavy unhydrotreated gasoline.

Table 4 shows that fractionating the FCC gasoline in the light and heavy fractions with a cut point of 100° C. and hydrotreating the heavy 100° C.-FBP fraction led to an octane loss in the full-range FCC gasoline of 1.8 RON and 1.0 MON.

Fractionating with a cut point of 140° C. and hydrotreating the heavy 140° C.-FBP fraction led to an octane loss in the full-range FCC gasoline of 0.6 RON and 0.6 MON.

Assuming a sulfur distribution in the FCC gasoline shown in Table 1, in which total FCC gasoline sulfur is 36.8 ppm, then at 20 ppm total FCC gasoline sulfur the light gasoline (IBP-140° C.) sulfur should be 10 ppm. At this sulfur level in the fraction IBP-140° C. and less than 1 ppm in the hydrotreated heavy gasoline, the total FCC gasoline sulfur should be 8.9 ppm (85% IBP-140° C. and 15% 140° C.-FBP). The octane losses in this case would be 0.6 RON and 0.6 MON.

Fig. 1 shows that 20 ppm sulfur in the FCC gasoline corresponds to a FCC feed sulfur level of 400 ppm. Fig. 2 shows that at 400 ppm sulfur in the FCC feed (hydrotreated vacuum gas oil) the expected cycle length of the FCC pretreater is 19 months.

Economic evaluation

For an economical evaluation of possible variants for production of FCC gasoline with sulfur content not higher than 10 ppm, we made these assumptions:

- The FCC pretreater capacity is 235 tons/hr (39,000 b/d).
- The unrealized benefit of 1 day downtime of the FCC unit is about $746,269, based on November 2007 data.
- Catalyst regeneration is performed ex-situ and the FCC pretreating unit downtime for catalyst unloading and reloading, including the time necessary

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Gail Killough
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Email: oilsandsconference@pennwell.com

EXHIBITOR AND SPONSORSHIP SALES:

Kristin Stavinoha
Ph: +1 713 963 6283 | Fax: +1 713 963 6212
Email: kristins@pennwell.com

Sue Neighbors (Petroleum)
Ph: +1 713 963 6256 | Fax: +1 713 963 6212
Email: sneighbors@pennwell.com

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for regeneration is 10 days, based on our field experience.

- Cost for regeneration and activation (sulfiding) of the FCC pretreater catalyst is $470,000, based on 2007 LNB data.
- After each regeneration the catalyst guard bed is replaced, which costs $63,625.
- The maximum number of catalyst regenerations is three.
- The duration of using one catalyst charge in the LNB FCC pretreater is 36 months. This figure is based on the amount of vacuum gas oil (VGO) processed for that period and the metals level in the VGO. We found that VGO from Urals crude (typical LNB crude) had high levels of arsenic (0.29 ppm), which shortens catalyst life.
- The cost for fractionation of the FCC gasoline into light and heavy fractions with a 140° C. cut point is about $19/ton FCC gasoline. The cost to fractionate FCC gasoline into light and heavy fractions with a 100° C. cut point is about $11/ton FCC gasoline. These figures are based on the required heat for FCC gasoline fractionation.
- The cost of heavy FCC gasoline hydrotreating is $8.6/ton FCC gasoline. This is based on field experience with LNB diesel hydrotreaters.
- The capital expenditure of revamping the existing LNB FCC pretreater is about $32.5 million. This is based on data for a future revamp of the existing LNB middle distillate hydrotreaters.
- Capital expenditure for constructing a new hydrotreater for desulfurization of heavy FCC gasoline is $20 million for a capacity of 20 tons/hr and $40 million for a capacity of 40 tons/hr.
- Capital expenditure for constructing a new unit for FCC gasoline fractionation is $3 million.
- Additional costs (amortization) are 12% of capital expenditures.
- The price of regular gasoline is $784/ton and premium gasoline is $806/ton. Production of finished premium gasoline decreases 47% when FCC gasoline is fractionated with a cut point of 100° C. and 13% when the cut point is 140° C.

Table 5 shows estimated costs of the different investigated cases for producing FCC gasoline with sulfur less than 10 ppm. These data indicate that the

HEAVY FCC GASOLINE BEFORE, AFTER HYDROTREATMENT

Table 3

Fraction analysis, wt %	140° C.-FBP	Hydrotreated 140° C.-FBP	100° C.-FBP	Hydrotreated 100° C.-FBP
n-C_4	0	0.07	0	0.06
n-C_5	0.03	0.05	0.02	0.36
n-C_6	0.01	0.12	0.15	0.99
n-C_7	0.04	0.36	0.5	1.03
n-C_8	0.2	0.69	0.63	0.81
n-C_9	0.4	0.76	0.45	0.54
n-C_{10}	0.47	0.61	0.37	0.31
n-C_{11}	0.46	—	0.25	0.21
Total n-paraffins	**1.61**	**2.59**	**2.37**	**4.31**
i-C_4	—	0.01	0	—
i-C_5	0.21	0.15	0.12	0.12
i-C_6	0.12	0.18	0.72	0.89
i-C_7	0.16	0.36	2.58	3.63
i-C_8	1.1	1.7	5.08	6.51
i-C_9	1.86	2.35	3.33	4
i-C_{10}	3.58	3.87	2.9	3.46
i-C_{11}	1.36	1.33	0.82	0.79
i-C_{12}	0.78	0.54	0.44	0.29
i-C_{13}	0.32	0.27	0.16	0.18
Total i-paraffins	**9.49**	**10.76**	**16.15**	**19.87**
O4	0.01	—	0.01	—
O5	0.32	—	0.2	—
O6	0.1	—	1.13	—
O7	0.21	0.02	2.72	0.18
O8	0.19	0.04	0.68	0.11
O9	0.49	0.17	0.38	0.26
O10	0.16	0.14	0.11	0.16
O11	0.08	—	—	—
Total olefins	**1.56**	**0.37**	**5.23**	**0.71**
N_5	0.01	0.02	0.05	0.14
N_6	0.03	0.16	0.45	0.75
N_7	0.25	0.67	2.32	3.53
N_8	0.51	0.72	1.87	—
N_9	1.38	1.25	1.69	—
N_{10}	0.27	0.45	0.24	—
Total naphthenes	**2.45**	**3.27**	**6.62**	—
A_6	0.03	0.03	0.43	0.3
A_7	1.09	1.23	5.45	5.25
A_8	11.05	10.3	16.16	16.02
A_9	23.34	22.28	18.53	18.07
A_{10}	27.36	25.06	15.36	13.75
A_{11}	10.57	12.8	3.43	5.73
A_{12}	0.1	0.08	2.04	0.03
Total aromatics	**73.54**	**71.78**	**61.4**	**59.15**
Unidentified	11.35	11.16	8.23	7.1
Total	100	100	100	100
Sulfur, ppm	160	0.9	112	0.8
RON	**95**	**90.9**	**93.2**	**87.3**
MON	**85.3**	**81.3**	**82.4**	**79.2**
ΔRON	**-4.1**		**-5.9**	
ΔMON	**-4**		**-3.2**	

Octane losses

Table 4

	FCC gasoline blend			
Component 1	IBP-140° C., 85%	IBP-140° C., 85%	IBP-100° C., 70%	IBP-100° C., 70%
Component 2	Unhydrotreated 140° C.-FBP, 15%	Hydrotreated 140° C.-FBP, 15%	Unhydrotreated 100° C.-FBP, 30%	Hydrotreated 100° C.-FBP, 30%
RON	92.5	91.8	92.4	90.7
MON	81.4	80.8	81.6	80.6
RON change		–0.6		–1.8
MON change		–0.6		–1.0

capital expenditure is the highest for FCC gasoline fractionation with a cut point of 100° C. and hydrogenation of the heavy gasoline. This case also exhibits the poorest economics.

Fractionation and hydrodesulfurization of heavy gasoline is economically unfavorable mainly because of the high operating cost of fractionation. We investigated another case at a lower operating cost. We found that the main fractionator of the LNB FCC unit was able to undercut the FCC gasoline.

Table 6 shows the distillation characteristics of FCC gasoline and LCO from the LNB FCC unit when the FCC gasoline has been undercut. Comparing these data and those in Table 2 shows that the main fractionator can produce light gasoline, and the heavy gasoline remains in the LCO.

In that case, an additional fractionation column is needed to separate heavy gasoline from LCO. Operating costs of this fractionator would be less than that of the whole FCC gasoline fractionation.

Table 7 summarizes the estimated costs of the different cases for production of 10-ppm sulfur FCC gasoline when the heavy gasoline is separated from the LCO. These data show that fractionation of FCC gasoline into a light and heavy fraction with a cut point of 100° C. and hydrotreating the heavy gasoline is possibly the worst case.

Fractionating the FCC gasoline with a cut point of 140° C. and hydrotreating the heavy gasoline is better economically than operating the existing FCC pretreater at a higher severity. That case, however, is more capital intensive because it requires the construction of an additional fractionator and gasoline hydrotreater. The case with a revamp of the existing FCC pretreater is the most favorable variant.

We have not completely evaluated downtime of the FCC unit for revamping the FCC feed pretreating unit assuming that it could be performed

Economic evaluation, fractionation of full-range FCC gasoline

Table 5

Indicies	HDS of the FCC feed to 150-ppm sulfur	HDS of FCC feed to 300 or 400-ppm sulfur, fractionation of FCC gasoline, HDS of heavy gasoline: Heavy FCC gasoline fraction 140° C.-FBP	Heavy FCC gasoline fraction 100° C.-FBP	Revamp of the FCC pretreater and HDS of the FCC feed to 150-ppm sulfur
Catalyst volume, cu m	Base	Base	Base	1.92 × Base
Cycle length, months	4	13	19	19
Regenerations/year	3	1	0.63	0.63
Start-of-run WABT, °C.	387	375	370	370
Catalyst cost, $/year	4,113,441	1,371,147	1,127,772	2,165,322
Regeneration cost, $/year	1,409,996	469,998	296,099	568,510
Unrealized benefit from FCC unit down time, $/year	22,388,060	7,462,687	4,701,493	4,701,493
Unit revamp capital expenditure, $	—	19,104,478	35,223,881	32,742,537
Additional costs (amortization), $/year	—	2,388,060	4,402,985	4,092,817
Operating cost for FCC gasoline fractionation and HDS of the heavy gasoline, $/year	—	17,040,000	11,789,373	—
Unrealized benefit of production of less premium gasoline, $/year	—	2,894,408	10,705,585	—
Total costs without revamp capital expenditures, $/year	**27,911,496**	**31,626,300**	**33,023,307**	**11,528,142**

during a scheduled turnaround. This case nevertheless looks significantly better than those with FCC gasoline fractionation and hydrotreating of the heavy gasoline.

Even assuming a technology can selectively hydrodesulfurize with no octane loss,[7 8] the high operating cost of fractionation, which requires evaporating and condensing about 80% of the full-range FCC gasoline, is the bottleneck for producing near-zero sulfur FCC gasoline.

Moreover, sulfur in the full-range FCC gasoline should be not more than 20 ppm, otherwise even with hydrodesulfurization of the heavy FCC gasoline, the final blend would not achieve the target of 10-ppm sulfur.

Findings

Our evaluation of the required severity increase in the LNB FCC feed pretreater to guarantee production of 10-ppm sulfur FCC gasoline showed an expected cycle length of about 5 months. This shorter cycle length would result in higher costs and lower FCC unit availability.

Fractionating the FCC gasoline and hydrotreating the heavy fraction allows a lower severity in the FCC pretreater and leads to a reasonable cycle length while producing near-zero sulfur gasoline. The fractionation, however, is only attractive if it is carried out by undercutting the gasoline in the FCC main fractionator and heavy gasoline distilled from the LCO.

If the full-range FCC gasoline is fractionated in a separate column, the benefit of longer FCC unit availability cannot offset the high fractionation operating costs. If a revamp of the FCC pretreater is feasible, this variant offers the best economics regardless of the relatively higher capital expenditure.

UNDERCUT FCC GASOLINE, LCO

Table 6

Fraction, vol %	Undercut FCC gasoline -Distillation ASTM D-86, °C.-	FCC LCO -Distillation ASTM D-86, °C.-
IBP	31	155
5	41	175
10	46	178
20	54	184
30	62	190
40	70	196
50	79	203
60	92	211
70	107	222
80	121	235
90	139	251
95	150	262
FBP	162	273
Recovery, vol %	98	98

References

1. Ivanov, A., and Argirov, G., "Refining technology achievements to produce environmental friendly gasoline," Oxidation Communication, Vol. 28 (2005), No. 2, pp. 253-72.

2. Stratiev, D., Donov, A., and Stratiev, G., "Evaluation of Lukoil Neftochim Bourgas fluid catalytic cracking feed hydrotreater performance in a mild hydrocracking mode," Oil & Gas European Magazine, June 2005, pp. 87-91.

3. Andonov, G., Petrov, S., Stratiev, D.,

ECONOMIC EVALUATION, SEPARATION OF HEAVY FCC GASOLINE, LCO

Table 7

	HDS of FCC feed to 300 or 400-ppm sulfur, fractionation of FCC gasoline, and HDS of heavy gasoline			
	HDS of the FCC feed to 150-ppm sulfur	Heavy FCC gasoline fraction 140° C.-FBP	Heavy FCC gasoline fraction 100° C.-FBP	Revamp of the FCC pretreater and HDS of FCC feed to 150-ppm sulfur
Catalyst volume, cu m	Base	Base	Base	1.92 × Base
Cycle length, months	4	13	19	19
Regenerations/year	3	1	0.63	0.63
Start-of-run WABT, °C.	387	375	370	370
Catalyst cost, $/year	4,113,441	1,371,147	1,127,772	2,165,322
Regeneration cost, $/year	1,409,996	469,998	296,099	568,510
Unrealized benefit from FCC unit down time, $/year	22,388,060	7,462,687	4,701,493	4,701,493
Unit revamp capital expenditure, $	—	19,104,478	35,223,881	32,742,537
Additional costs (amortization), $/year	—	2,388,060	4,402,985	4,092,817
Operating cost for FCC gasoline fractionation and HDS of the heavy gasoline, $/year	—	6,592,239	7,960,597	—
Unrealized benefit of production of less premium gasoline, $/year	—	2,894,408	10,705,585	—
Total costs without revamp capital expenditure, $/year	27,911,496	21,178,539	29,194,531	11,528,142

and Zeuthen, P., "MHC mode vs HDS mode in an FCC unit in relation to Euro IV fuels specifications," presented to the European Refining Technology Conference 10th Annual Meeting, Nov. 14-16, 2005, Vienna.

4. Zeuthen, Per, "FCC Pretreatment Catalysts—Optimum Catalyst Selection and Improved Stability," presented to the Haldor Topsoe Hydrotreating Seminar, Sept. 10-12, 2006, Copenhagen.

5. Dobrev, D., Stratiev, D., Petkov, P., Tzingov, T., and Argirov, G., "Fluid catalytic cracking Feed pretreatment a way for production of ultra clean fuels," proceedings of the 43rd International Petroleum Conference, Bratislava, Sept. 25-26, 2007.

6. Stratiev, D., Ivanov, A., and Jelyaskova, M., "Effect of feedstock end boiling point on product sulfur during ultra deep diesel hydrodesulfurization," Oil & Gas European Magazine, No. 4, 2004, p. 188.

7. Simpson, S.G., "European Gasoline Solutions," proceedings of the 39th International Petroleum Conference, Bratislava, Sept. 20-23, 1999, pp. A9-1-A9-12.

8. Rutherford, F.M., and von Schmidt, E., "Processing Strategies for FCC Gasoline to Meet the EU Fuels Specifications," Grace FCC Technology Conference 1998, Lisbon, Sept. 1-4, 1998.

The authors

Dicho Stratiev (stratiev.dicho@neftochim.bg) is an associate professor, PhD, and research department manager for Lukoil Neftochim Bourgas, Bulgaria. He has held several positions in research and production activities during his 17 years with Lukoil Neftochim Bourgas. Stratiev holds an MS in chemical engineering in organic chemistry and a PhD in oil refining from Bourgas University.

Todor Tzingov is a research associate in the catalysis section of the Lukoil Neftochim Bourgas research and development department. He joined Lukoil Neftochim Bourgas in 1977 as a shift supervisor in the normal paraffins unit. In 1981, Tzingov was appointed as a research associate in the catalysis laboratory in the Research Institute for Oil Refining and Petrochemistry in Lukoil Neftochim. In 2004 he was appointed too his current position. He holds an MS in chemical engineering in oil refining engineering from Bourgas University.

Georgi Argirov is a research associate in the catalysis section of the Lukoil Neftochim Bourgas research and development department. He joined Lukoil Neftochim Bourgas in 2001 as an operator in the absorption gas fractionating unit. After this, Argirov joined the catalysis laboratory in the Research Institute for Oil Refining and Petrochemistry as a process engineer. He holds an MS in inorganic chemistry engineering from Bourgas University.

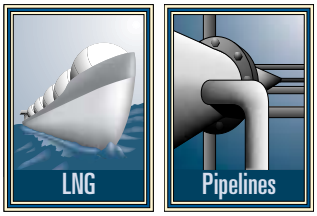
Ivelina Shishkova is a research associate in the catalysis section of the Lukoil Neftochim Bourgas research and development department. She joined Lukoil Neftochim Bourgas in 2002 as a process engineer in the catalysis laboratory in the Research Institute for Oil Refining and Petrochemistry. Shishkova was appointed as a research associate in this laboratory in 2003. She holds an MS in organic chemistry engineering from Bourgas University.

North African gas provides ready European supply option

Julian Critchlow
Bain & Co.
London

Roberto Prioreschi
Bain & Co.
Rome

Joseph Scalise
Bain & Co.
San Francisco



The relatively short distance between North African natural gas fields and Europe's consumer markets makes North Africa the most attractive source to meet future European gas demand. Most European ports and pipeline access points lay well within 2,000 km of North African production, and transportation will add less than $100/1,000 cu m via offshore pipelines and little more than $50/1,000 cu m for gas that moves via onshore pipes or if shipped in a liquefied state (Fig. 1).

This article assesses the relative advantages and disadvantages of sourcing gas for European consumption from North Africa and the Caspian region.

Background

European efforts to secure dependable new natural gas supply sources come at a time of upheaval in Europe's gas industry. To stimulate competition, EU regulators have increased efforts to weaken national oligopolies. Major non-EU gas producers like Gazprom and Sonatrach, meanwhile, are trying to enter Europe's attractive downstream markets, including those in the UK, Germany, and Italy.

Facing new obstacles in their domestic markets, European energy companies, utilities, and their financial backers concurrently face increasing difficulties in winning access to promising gas fields beyond EU borders. They are contending with huge business risks as they decide whether to stake out their own positions or grow through mergers and acquisitions to build the exploration, production, and transportation infrastructure required to move gas from wellhead to end-user.

EU governments, producers, and consumers face two major hurdles. Gas prices have risen sharply. The EU's increased reliance on gas to replace less environmentally friendly coal in power generation, along with a surge in new energy demand from China and India, have nearly doubled natural gas prices during the past 2 years.

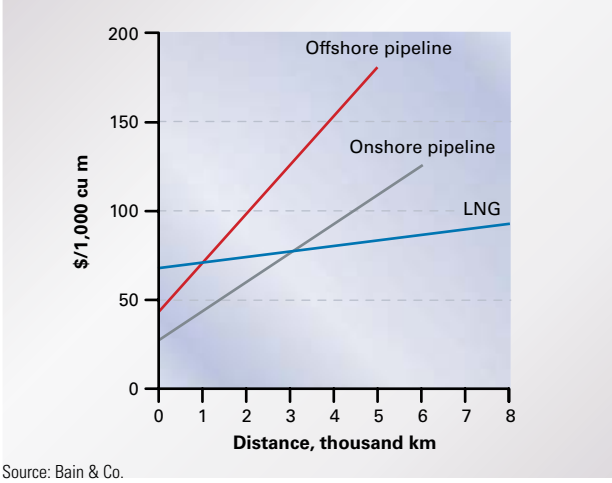
Capital costs are also rising. Investments in new pipeline and LNG facilities already in the works are slated to increase Europe's gross transport capacity by 27% by 2013. The global gas industry is consolidating rapidly. Mergers and acquisitions in the sector have increased at 40%/year compounded over the past 3 years, to more than $370 billion in 2007[2].

EU gas consumers also face ongoing political uncertainty and heightened security risks. Russia has shown that it is prepared to flex its energy muscles as a political weapon against its former Soviet and Warsaw Pact neighbors, using the threat to shut off supplies to force them to renegotiate long-term contracts. Political instability across the gas-rich nations of Central Asia, the Middle East, and North Africa poses an ongoing threat to the security of EU energy markets.

Faced with these uncertainties, Europe's energy companies are looking to diversify supply sources. Twenty-one

TOTAL TRANSPORT COST

Fig. 1



Source: Bain & Co.

Major European pipeline projects

Table 1

Pipeline	Route	Specifications	Capacity, billion cu m/ year	Start date	Owners	Risks
Nord Stream	Russia to Germany	Length: 1,198 km OD: 1,220 mm Maximum allowable operating pressure: 220 bar	55	Line 1: 2010 Line 2: 2012	Gazprom, 51%; Wintershall, 24.5%; E.ON Ruhrgas, 24.5%	Date for completion of environmental impact report has been pushed back nearly a year to April 2008.
IGI	Greece to Italy (extension of Turkey to Greece pipeline)	Length: 815 km OD: 914 mm, onshore; 813 mm, offshore MAOP: 75 bar, onshore; 150 bar, offshore	8	2012	Edison Italia, 80%; DEPA, 20%	Uncertain whether the project will finalize approvals in 2008 (required to meet start date).
Galsi	Algeria to Sardinia, Italy	Length: 900 km OD: 1,067 mm, onshore; 711 mm, offshore MAOP: 220 bar	8	2012	Sonatrach, 38%; Edison Italia, 16%; Enel, 13.5%; Wintershall, 9%; Hera, 10%; and Regione Sardegna, 10%	Supply commitment is unclear.
Medgaz	Algeria to Spain	Length: 210 km OD: 610 mm	8	Mid 2009	CEPSA, 20%; Sonatrach, 36%; Iberdrola, 20%; Endesa and Gaz de France, 12% each	
Nabucco	Turkey to Austria	Length: 3,300 km OD: 1,422 mm	31	2012	OMV, MOL, RWE, Transgaz, Bulgargaz, BOTAS; 16.67% each	Gazprom remains intent on pursuing competing projects.
Blue Stream extension	Turkey to Hungary	Length: 1,250 km OD: 1,400 mm, main land; 1,200 mm, mountain region; 610 mm, offshore. MAOP: 250 bar	16	2010	Gazprom, Eni.	A rival to Nabucco, targetting same market. Unlikely both will be built.
Arab Natural Gas Pipeline	Egypt to Turkey	Vary country to country.	10	Final leg extending the pipeline to Turkey to be completed after 2008.		Regional political volatility.
South Stream	Russia to Bulgaria	Bypassing Turkey, the line will run 560 miles to Bulgaria then fork, with one line extending to Austria and Northern Italy and another going to Greece and Southern Italy.	30	2013	Gazprom, Eni	Another Nabucco rival.

major pipelines and LNG regasification facilities are currently either under construction or planned for completion by 2013, with 250 billion cu m/year capacity to transport new supply from Central Asia and North and West Africa; enough gas to meet about half of EU's annual consumption (Tables 1-2).

Caspian

Many of the most promising new gas fields in terms of proven reserves lie in the former Soviet republics of Central Asia, mainly in Azerbaijan, Kazakhstan, Turkmenistan, and Uzbekistan. The four nations' combined reserves total slightly more than 8 trillion cu m, with Turkmenistan accounting for roughly 40% of the total. With 2007 annual production of 61.6 and 58.7 billion cu m, respectively, Turkmenistan and Uzbekistan also rank as the region's leading producers (Fig. 2).

Gas sourced from Central Asia, however, faces large political and regulatory risks. Of the five proposed pipeline projects that will carry gas from the region, three will be controlled either directly or indirectly by Russia, including the Blue Stream pipeline's extension. A joint venture between Gazprom and Eni, Blue Stream will by 2010 transport 16 billion cu m/year 1,250 km from the Russian pipeline network through Turkey to Hungary.

Two other proposed pipelines running through Turkey aim to connect the Caspian fields directly to EU markets. The 3,300-km Nabucco pipeline will feed 31 billion cu m/year of gas into Europe, connecting the Caspian region via Turkey to a terminus in Austria. Nabucco's schedule calls for completion in 2012, but doubt remains whether it will be built at all.

Gazprom and Eni's recently agreed 560-mile, 30 billion cu m/year South Stream pipeline, running across Bulgaria to deliver gas from Azerbaijan and Iran to Hungary and Italy, may preempt the need for Nabucco. South Stream's proposed route runs from Russia to Bulgaria across the Black Sea, bypassing Turkey. It then forks in two directions: one going north to Austria and northern Italy; the other south to Greece and southern Italy. The companies expect South Stream to be completed by 2013.

Another project that would create a direct South Mediterranean gas ring to Central Asia and due to begin construction this year is the Italy-Greece Interconnector pipeline, a joint venture of Edison Italia and DEPA. Designed to deliver 8 billion cu m/year of gas and to come online by 2012, IGI has broad EU support but is still in the permitting

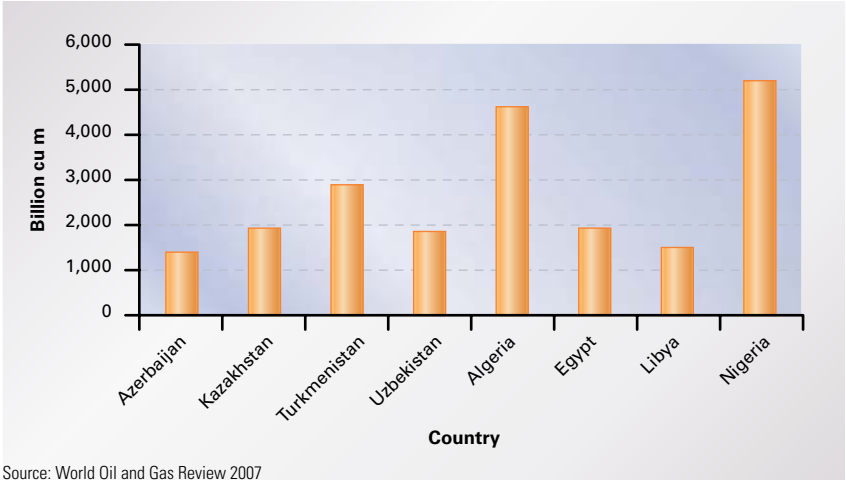
SELECT PROPOSED EUROPEAN LNG REGASIFICATION FACILITIES

Table 2

Project	Location	Owner	Start date	Capacity, billion cu m/year
Fos Cavaou	Marseilles, France	Gaz de France, Total	Mid 2008	8.25
Rosignano	Rosignano, Italy	BP, Edison Italia	2010	3
OLT Offshore	Toscana, Italy	Iride Mercato, Endesa Europa, Golar LNG Ltd	2009	4
Brindisi	Brindisi, Italy	BG Group	2010	8, Phase 1 16, Phase 2
Taranto	Puglia, Italy	Gas Natural	2009	8
Gioia Tauro	Calabria, Italy	Societa Petrolifera Gioia Tauro	None announced	12
Priollo	Sicily, Italy	Shell Energy Europe, ERG Power & Gas SPA	2010-2011	8
Porto Empedocle	Sicily, Italy	Nuovo Energie	None announced	8
Trieste	Trieste, Italy	Endesa Friulia	2012	8
Isola di Porto Levante	Rovigo, Italy	Qatar Petroleum, ExxonMobil, Edison Gas	2008	8
Le Verdon	Bordeaux, France	4Gas	2011	2-3

NATURAL GAS RESERVES, 2007

Fig. 2



Source: World Oil and Gas Review 2007

process. Whether it ends up meeting its goals depends on completion of three other pipelines connecting it to the Turkish network and ultimately to Iran and Central Asia.

Africa

Sourcing gas from the vast, and still largely untapped, North and West African fields of Algeria, Egypt, Libya, and Nigeria offers energy and utility companies more promising commercial prospects. Combined, the four nations' proven reserves topped 13 trillion cu m in 2007, nearly double those of the Caspian region, and production was also greater (Fig. 3).

African gas also lies much closer to European markets than Central Asia's and is better situated to permit direct import via either pipeline or LNG delivery. Two new pipelines—the 210-km Medgaz connecting Algeria to the southern coast of Spain and the 900-km Galsi running undersea from Algeria to Sardinia—are scheduled to come on line in 2009 and 2012, respectively. Each will feed 8 billion cu m/year of gas into Europe's pipeline grid.

Completion of a third pipeline, the Arab Natural Gas Pipeline, linking North African-sourced gas with supplies coming from Central Asia, faces greater problems. The multiphase plan foresees construction of a line transporting 10 billion cu m/year of gas across deserts and undersea from Egypt; traversing Syria, Lebanon, and Jordon en route to Turkey, where it would connect with Nabucco. Beyond any questions regarding Nabucco, the complicated politics of the Middle East keep the Arab Natural Gas Pipeline's overall fate uncertain, even while sporadic construction progress is reported.

A dozen new LNG regasification terminals slated to open from western France to Trieste, however, will add another 100 billion cu m/year of new import capacity by 2012.

African infrastructure

Africa's underdeveloped and fragmented infrastructure poses the biggest impediment to moving its natural gas resources into Europe, while at the same time offering Europe's large and mid-sized energy companies and investors an opportunity.

Conditions for improving Africa's infrastructure are more favorable than they have been for some time. Among gas-rich North African countries, Egypt's production and export capacity has grown most rapidly, making it the most attractive market for new entrants. Completion of three LNG trains with two more in the works has helped Egypt boost production by 14%/year for the past 5 years.

Lifting US sanctions on Libya in 2004 has brought US oil and gas companies back into the country where they are now competing with European companies for exploration and production concessions under a new open-bid process. Algeria, already North Africa's largest natural gas producer with an

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Jonathan Franklin
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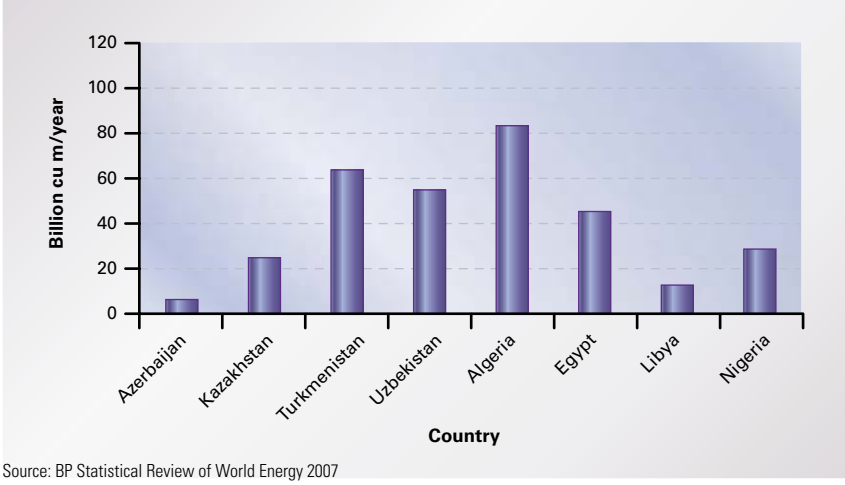
NATURAL GAS PRODUCTION, 2006

Fig. 3



Source: BP Statistical Review of World Energy 2007

output of 101 billion cu m/year recently began a long-delayed new round of bids for oil and gas leases.

Newcomers to the region face three options: pursue upstream exploration and production leases, invest in downstream export infrastructure by building gas liquefaction terminals, or both. Securing production facilities has emerged as the preferred entry strategy. Companies that invest in exploration and production and can tap their own gas supply for export face less risk regarding the terms and volumes at which supplies will be available.

Once a company commits to establishing an upstream presence, it must decide whether to enter the market by building a position from scratch or acquiring a company already active in the region. Companies that choose to pursue an organic-growth strategy by bidding for new lease concessions must further decide whether to do so alone or in partnership with other companies.

A company that wins an exploration and production concession must be prepared to build an on-site organization in cooperation with local partners and government agencies. It must also navigate the sometimes intricate rules governing joint ventures with state-owned partners.

Egypt has one of the more straightforward and consistent regulatory frameworks for exploration and development agreements, but the details remain important. A foreign firm entering a 50-50 joint venture with EGAS, the state-owned gas company, bears all initial exploration risks and development costs. Once a field starts producing, the contractor may recover its initial investment outlays and all operation costs up to 40% of production. Any further production is then split equally between the contractor and EGAS.

Companies might choose to join forces to lease concession rights with other foreign partners already active in North Africa, but will obviously still need to perform thorough due diligence regarding the quality of the lease. They must also establish clearly from the outset how responsibilities will be shared and then be prepared to manage the relationship. Entering a North African market through partnerships, however, can still serve as an effective means of building local expertise and establishing a successful long-term presence.

The quality of a target company's lease concessions ranks among the most important considerations for companies wishing to enter North Africa through acquisition. Beyond such standard key indicators as the total volume of gas reserves, the ratio of production to reserves, and production costs, important issues specific to North Africa's underdeveloped infrastructure require consideration. Chief among these is the distance from producing fields to transportation and export facilities. Companies that control existing pipelines or LNG ports, or holding a stake in projected ones, would be especially attractive acquisition targets.

The bottleneck in regional export facilities remains particularly acute in Egypt and Libya. ✦

References

1. BP Statistical Review of World Energy, 2007.

2. PriceWaterhouse Coopers Power Deals, 2007.

The authors

Julian Critchlow is a partner with Bain & Co., based in London. He has also served as a chemical engineer at ICI and Exxon. He holds MA and masters of engineering degrees from Cambridge University (1986,1987) and an MBA with honors from The Wharton School at the University of Pennsylvania (1991). He leads Bain's European energy and utilities practice.

Roberto Prioreschi is a partner with Bain & Co., based in Rome. He has previously worked for Procter & Gamble and Enel SpA. He is an honors graduate in economics from Spienza University, Rome (1992). He is a member of Bain's energy and utilities practice.

Joseph Scalise is a partner with Bain & Co., based in San Francisco. He has previously worked at the board of governors of the US Federal Reserve System in Washington, DC. He holds a BA degree summa cum laude from Lehigh University (1993) and an MBA from The Wharton School at the University of Pennsylvania (1998). He is a member of Bain's global energy and utilities practice.

Equipment/Software/Literature

New mud pump features five cylinders

The Quintuplex 2200 is the newest in a line of mud pumps.

It features five cylinders instead of the typical three cylinders, which helps reduce piston rod load by more than 40%.

Its reduced pressure variation of more than 70% (undampened) reduces mud noise on the drillstring, which allows for more efficient measurement while drilling and logging while drilling, the company says. The pump has a balanced eccentric crankshaft supported by four main (continuous antifriction) roller bearings. Also, its double (redundant) fail-safe internal lube systems reduce wear on system components, the firm points out.

Source: **Ellis Williams Engineering Co.,** 339 Magnolia Business Park Drive, Magnolia, TX 77354.

Fully integrated wireless pressure switch

A new, fully integrated, self-contained wireless pressure switch is designed specifically for monitoring industry pressure.

The AWI-PS wireless pressure switch is suited for use where accurate monitoring is needed. Available in battery powered and AC powered versions, the switch includes the wireless transmitter, pressure switch, and self-contained power source all in one lightweight, rugged, case aluminum enclosure.

The maker says the wireless pressure switch provides tank farms, pipelines, in-plant, and other industry applications pressure monitoring and measurement without the constraints of hard wiring. The bellows pressure-sensing elements in the pressure switch device are constructed from 316 stainless steel and offer adjustable pressure ranges of as much as 0-5,000 psi. The firm says the design utilizes a switching mechanism that results in improved life, repeatability, and lower deadbands.

This switch collects real time data and helps avoid costly cable and conduit runs, lowers labor and material installation costs, and monitors devices where cabling isn't an option, the company notes.

Source: **Meriam Adalet Wireless Div., Scott Fetzer Co.,** 4801 W. 150th St., Cleveland, OH 44135.

Services/Suppliers

Ambar Lone Star Fluid Services,

Lafayette, La., has appointed R.E. "Ed" Gee regional sales manager overseeing all aspects of Ambar Lone Star's sales accounts and sales force in the Dallas/Fort Worth (DFW) area and coordinating efforts for North and East Texas and Midcontinent regions. He previously served as Ambar Lone Star's DFW sales manager. Prior to that, Gee spent 30 years with Dowell Schlumberger. He is a geology graduate of Marshall University in Huntington, W.Va.

Gee

Brazzel

Replacing Gee as DFW sales manager is Zachary L. Brazzel. He previously served Ambar Lone Star as a DFW executive sales representative and as a technical service representative for the Gulf of Mexico. Brazzel is a 2002 graduate of Louisiana State University with a degree in business administration. Replacing Brazzel as DFW executive sales representative is P. Boone DuBose, who previously served as a technical service representative for Ambar Lone Star in the Gulf of Mexico and in the Barnett Shale area. DuBose graduated in 2004 from the University of Texas at Austin with a degree in sociology.

DuBose

Ambar Lone Star Fluid Services offers a complete line of drilling and completion fluids, with operations throughout the Gulf Coast, South Texas, East Texas, and Permian/Midcontinent regions. It is a subsidiary of Patterson-UTI Energy, Inc., the second-largest onshore contract driller in North America.

Robert I. Johnston, vice-president and division manager of Henkels & McCoy Inc., has been elected president of the Pipe Line Contractors Association (PLCA) for 2008. Johnson has served as a PLCA director from 2000 to the present and was elected treasurer of the association in 2005 and vice-president in 2006 and 2007. Other officers and directors of PLCA for 2008 are First Vice-Pres. Don W. Thorn, Welded Construction LP; Second Vice-Pres. Brian L. Ganske, Snelson Cos. Inc.; Treasurer Christopher T. Leines, Minnesota Ltd. Inc.; and new directors Bernie Bermack, Associated Pipe Line Contractors Inc.; M. Daniel Murphy, Precision Pipeline LLC; and Ronnie F. Wise, Gregory & Cook Construction Inc. In addition, Robert H. Westphal has been appointed to the PLCA board.

Abanaki Corp.,

Chagrin Falls, Ohio, has acquired Chardon, Ohio-based Aerodyne Development Corp. Abanaki is the world's leading manufacturer of industrial oil skimmers. Aerodyne manufactures dust collection systems equipment and solid materials-handling components. The deal—financial terms of which were not disclosed—marks Abanaki's plan for growth in the solid materials-handling market.

Imports of crude and products

	Districts 1-4		District 5		Total US		
	3-28 2008	3-21 2008	3-28 2008	3-21 2008	3-28 2008	3-21 2008	*3-30 2007
	1,000 b/d						
Total motor gasoline	904	931	40	32	944	963	1,009
Mo. gas. blending comp.	590	578	—	32	590	610	526
Distillate	321	237	1	5	322	242	375
Residual	176	425	140	—	316	425	580
Jet fuel-kerosine	101	41	10	—	111	41	165
Propane-propylene	145	135	24	22	169	157	221
Other	754	787	(16)	11	738	798	580
Total products	**2,991**	**3,134**	**199**	**102**	**3,190**	**3,236**	**3,456**
Total crude	**9,009**	**7,976**	**1,274**	**922**	**10,283**	**8,898**	**10,245**
Total imports	**12,000**	**11,110**	**1,473**	**1,024**	**13,473**	**12,134**	**13,701**

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

Purvin & Gertz LNG netbacks—Apr. 4, 2008

Receiving terminal	Liquefaction plant					
	Algeria	Malaysia	Nigeria	Austr. NW Shelf	Qatar	Trinidad
	$/MMbtu					
Barcelona	8.49	6.21	7.57	6.09	6.88	7.48
Everett	8.76	6.34	8.33	6.39	7.01	9.10
Isle of Grain	9.67	7.20	9.43	7.08	7.88	8.95
Lake Charles	7.00	4.77	6.73	4.96	5.31	7.72
Sodegaura	6.73	8.42	6.63	8.43	7.68	5.64
Zeebrugge	8.56	6.47	8.13	6.35	7.12	8.10

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	15,519	61,453	33,688	8,721	33,532	14,452	2,585
PADD 2	65,373	54,760	19,003	7,803	30,661	1,221	8,116
PADD 3	169,530	70,418	34,545	12,510	28,850	17,855	13,607
PADD 4	13,854	6,278	1,927	344	3,264	279	[1]858
PADD 5	54,888	31,801	24,447	8,689	13,413	5,929	—
Mar. 28, 2008	**319,164**	**224,710**	**113,610**	**38,067**	**109,720**	**39,736**	**25,166**
Mar. 21, 2008	**311,847**	**229,235**	**114,582**	**38,006**	**111,349**	**38,638**	**25,412**
Mar. 30, 2007[2]	**332,721**	**205,201**	**92,442**	**40,082**	**117,952**	**38,560**	**25,115**

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

Refinery report—Mar. 28, 2008

District	Refinery operations		Refinery output				
	Gross inputs	Crude oil inputs	Total motor gasoline	Jet fuel, kerosine	Fuel oils: Distillate	Fuel oils: Residual	Propane-propylene
	1,000 b/d						
PADD 1	1,248	1,270	1,651	107	428	103	53
PADD 2	2,956	2,940	2,266	181	834	49	189
PADD 3	6,894	6,825	2,879	685	1,830	352	701
PADD 4	525	523	281	23	180	13	[1]127
PADD 5	2,738	2,649	1,531	509	584	188	—
Mar. 28, 2008	**14,361**	**14,207**	**8,608**	**1,505**	**3,856**	**705**	**1,070**
Mar. 21, 2008	**14,326**	**14,135**	**8,539**	**1,362**	**3,858**	**643**	**1,011**
Mar. 30, 2007[2]	**15,143**	**14,841**	**8,773**	**1,457**	**4,050**	**645**	**1,047**
	17,436 operable capacity		**82.4% utilization rate**				

[1]Includes PADD 5. [2]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.

OGJ crack spread

	*4-4-08	*4-6-07	Change	Change, %
	$/bbl			
SPOT PRICES				
Product value	115.09	82.53	32.57	39.5
Brent crude	102.04	68.62	33.42	48.7
Crack spread	13.05	13.91	–0.86	–6.2
FUTURES MARKET PRICES				
One month				
Product value	117.80	82.96	34.84	42.0
Light sweet crude	103.49	64.99	38.50	59.2
Crack spread	14.31	17.97	–3.66	–20.4
Six month				
Product value	112.65	80.57	32.08	39.8
Light sweet crude	100.89	69.35	31.54	45.5
Crack spread	11.76	11.22	0.54	4.8

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

OGJ GASOLINE PRICES

	Price ex tax 4-2-08	Pump price* 4-2-08	Pump price 4-4-07
	¢/gal		
(Approx. prices for self-service unleaded gasoline)			
Atlanta	290.0	329.7	268.1
Baltimore	277.7	219.6	271.4
Boston	272.8	314.7	263.6
Buffalo	275.9	336.0	280.5
Miami	292.4	342.7	285.8
Newark	273.1	306.0	254.2
New York	255.9	316.0	272.8
Norfolk	279.7	317.3	261.8
Philadelphia	273.4	324.1	278.8
Pittsburgh	272.1	322.8	268.8
Wash., DC	286.9	325.3	277.4
PAD I avg.	277.3	323.1	271.2
Chicago	306.8	357.7	298.8
Cleveland	277.9	324.3	266.2
Des Moines	283.9	324.3	262.2
Detroit	273.8	323.0	270.5
Indianapolis	283.0	328.0	270.5
Kansas City	283.7	319.7	257.8
Louisville	298.5	335.4	270.8
Memphis	285.9	325.7	260.5
Milwaukee	271.0	322.3	277.5
Minn.-St. Paul	278.2	318.6	264.1
Oklahoma City	282.0	317.4	258.2
Omaha	281.4	327.8	268.5
St. Louis	276.9	312.9	261.9
Tulsa	275.3	310.7	258.8
Wichita	269.2	312.6	261.5
PAD II avg.	281.8	324.0	267.2
Albuquerque	281.2	317.6	267.1
Birmingham	288.8	327.5	261.5
Dallas-Fort Worth	283.1	321.5	265.1
Houston	282.1	320.5	261.8
Little Rock	285.0	325.2	260.5
New Orleans	284.4	322.8	260.2
San Antonio	276.8	315.2	250.6
PAD III avg.	283.1	321.5	261.0
Cheyenne	280.3	312.7	252.2
Denver	291.2	331.6	271.1
Salt Lake City	282.0	324.9	259.1
PAD IV avg.	284.5	323.1	260.8
Los Angeles	293.7	352.2	321.7
Phoenix	272.5	309.9	279.4
Portland	303.9	347.2	298.8
San Diego	305.7	364.2	330.3
San Francisco	321.3	379.8	347.0
Seattle	302.9	355.3	303.4
PAD V avg.	300.0	351.4	313.4
Week's avg.	**283.6**	**327.2**	**273.4**
Mar. avg.	**276.1**	**319.7**	**254.0**
Feb. avg.	**259.5**	**303.1**	**228.0**
2008 to date	**266.5**	**310.1**	—
2007 to date	**194.1**	**237.1**	—

*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

	3-28-08 ¢/gal		3-28-08 ¢/gal
Spot market product prices			
Motor gasoline (Conventional-regular)		Heating oil No. 2	
New York Harbor	270.40	New York Harbor	317.50
Gulf Coast	261.31	Gulf Coast	299.67
Los Angeles	292.06	Gas oil	
Amsterdam-Rotterdam-Antwerp (ARA)	NA	ARA	307.86
Singapore	270.02	Singapore	316.21
Motor gasoline (Reformulated-regular)		Residual fuel oil	
New York Harbor	247.65	New York Harbor	176.50
Gulf Coast	283.06	Gulf Coast	180.07
Los Angeles	296.06	Los Angeles	209.19
		ARA	189.35
		Singapore	190.59

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

BAKER HUGHES RIG COUNT

	4-4-08	4-6-07
Alabama	5	3
Alaska	9	13
Arkansas	44	43
California	34	32
Land	33	31
Offshore	1	1
Colorado	123	104
Florida	0	0
Illinois	0	0
Indiana	2	2
Kansas	12	14
Kentucky	12	9
Louisiana	142	191
N. Land	47	59
S. Inland waters	17	26
S. Land	25	41
Offshore	53	65
Maryland	0	0
Michigan	0	2
Mississippi	12	18
Montana	14	20
Nebraska	0	0
New Mexico	74	74
New York	8	7
North Dakota	54	33
Ohio	12	14
Oklahoma	206	176
Pennsylvania	22	17
South Dakota	2	1
Texas	904	807
Offshore	9	9
Inland waters	2	0
Dist. 1	26	23
Dist. 2	41	33
Dist. 3	54	52
Dist. 4	93	87
Dist. 5	185	162
Dist. 6	125	127
Dist. 7B	35	45
Dist. 7C	75	61
Dist. 8	126	107
Dist. 8A	21	25
Dist. 9	34	31
Dist. 10	78	45
Utah	38	42
West Virginia	23	29
Wyoming	68	69
Others—NV-3; TN-3; VA-4	10	9
Total US	**1,830**	**1,726**
Total Canada	**126**	**126**
Grand total	**1,956**	**1,852**
Oil rigs	362	283
Gas rigs	1,458	1,438
Total offshore	64	75
Total cum. avg. YTD	**1,774**	**1,734**

Rotary rigs from spudding in to total depth.
Definitions, see OGJ Sept. 18, 2006, p. 46.

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

SMITH RIG COUNT

Proposed depth, ft	Rig count	4-4 Percent footage*	Rig count	4-6-07 Percent footage*
0-2,500	82	6.0	58	6.8
2,501-5,000	114	52.6	101	60.3
5,001-7,500	205	20.4	213	23.0
7,501-10,000	419	2.6	420	4.0
10,001-12,500	473	4.0	416	3.6
12,501-15,000	296	—	263	—
15,001-17,500	114	—	111	0.9
17,501-20,000	75	—	72	—
20,001-over	35	—	38	—
Total	**1,813**	**7.5**	**1,692**	**8.6**
INLAND	28		36	
LAND	1,730		1,597	
OFFSHORE	55		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]4-4-08	[2]4-6-07
	1,000 b/d	
(Crude oil and lease condensate)		
Alabama	15	20
Alaska	709	746
California	650	665
Colorado	44	47
Florida	5	5
Illinois	26	28
Kansas	95	98
Louisiana	1,348	1,312
Michigan	14	16
Mississippi	51	59
Montana	93	91
New Mexico	163	163
North Dakota	114	115
Oklahoma	170	170
Texas	1,334	1,338
Utah	44	50
Wyoming	143	146
All others	63	72
Total	**5,081**	**5,141**

[1]OGJ estimate. [2]Revised.

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

US CRUDE PRICES

	4-4-08 $/bbl*
Alaska-North Slope 32°	85.76
South Louisiana Sweet	108.25
California-Kern River 13°	93.70
Lost Hills 30°	102.05
Southwest Wyoming Sweet	97.73
East Texas Sweet	102.25
West Texas Sour 34°	95.25
West Texas Intermediate	102.75
Oklahoma Sweet	102.75
Texas Upper Gulf Coast	99.25
Michigan Sour	95.75
Kansas Common	101.75
North Dakota Sweet	99.00

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

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

WORLD CRUDE PRICES

	3-28-08 $/bbl[1]
United Kingdom-Brent 38°	103.99
Russia-Urals 32°	98.73
Saudi Light 34°	100.20
Dubai Fateh 32°	95.74
Algeria Saharan 44°	104.67
Nigeria-Bonny Light 37°	105.23
Indonesia-Minas 34°	102.37
Venezuela-Tia Juana Light 31°	98.36
Mexico-Isthmus 33°	98.25
OPEC basket	100.69
Total OPEC[2]	99.45
Total non-OPEC[2]	99.16
Total world[2]	99.32
US imports[3]	96.65

[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]

	3-28-08	3-21-08	3-28-07	Change, %
	bcf			
Producing region	498	494	620	–19.7
Consuming region east	575	607	695	–17.3
Consuming region west	175	176	238	–26.5
Total US	**1,248**	**1,277**	**1,553**	**–19.6**
	Jan. 08	**Jan. 07**	**Change, %**	
Total US[2]	**2,055**	**2,379**	**–13.6**	

[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

	Jan. 2008	Dec. 2007	1 month average production 2008	1 month average production 2007	Change vs. previous year Volume	Change vs. previous year %	Jan. 2008	Dec. 2007	Cum. 2008
	Crude, 1,000 b/d						Gas, bcf		
Argentina	614	620	614	628	–14	–2.3	122.2	125.3	122.18
Bolivia	42	42	42	45	–3	–6.7	42.0	42.0	42.00
Brazil	1,776	1,806	1,776	1,736	40	2.3	34.0	32.0	34.00
Canada	2,539	2,463	2,539	2,552	–12	–0.5	522.5	521.7	522.48
Colombia	554	559	554	522	32	6.1	22.0	22.0	22.00
Ecuador	500	500	500	515	–15	–2.9	1.0	1.0	1.00
Mexico	2,957	2,954	2,957	3,143	–186	–5.9	202.6	198.7	202.60
Peru	107	118	107	120	–13	–10.6	7.0	9.0	7.00
Trinidad	115	114	115	120	–5	–4.5	130.0	130.0	130.00
United States	5,020	5,072	5,020	5,196	–176	–3.4	1,769.0	1,790.0	1,769.00
Venezuela[1]	2,440	2,430	2,440	2,490	–50	–2.0	75.0	75.0	75.00
Other Latin America	79	79	79	80	–1	–1.1	5.5	5.5	5.54
Western Hemisphere	**16,743**	**16,757**	**16,743**	**17,147**	**–404**	**–2.4**	**2,932.8**	**2,952.2**	**2,932.80**
Austria	16	18	16	17	–1	–7.5	5.0	5.5	5.00
Denmark	300	308	300	318	–18	–5.8	31.5	32.4	31.49
France	20	20	20	19	1	7.8	3.1	2.9	3.10
Germany	64	65	64	70	–6	–8.0	51.3	52.1	51.35
Italy	105	110	105	106	–1	–0.9	27.0	27.0	27.00
Netherlands	40	40	40	46	–6	–13.0	400.0	400.0	400.00
Norway	2,229	2,235	2,229	2,432	–203	–8.3	325.7	319.0	325.67
Turkey	39	40	39	38	1	2.6	0.0	0.0	0.00
United Kingdom	1,475	1,561	1,475	1,533	–58	–3.8	263.3	271.0	263.26
Other Western Europe	4	5	4	4	—	9.3	3.2	3.2	3.16
Western Europe	**4,292**	**4,401**	**4,292**	**4,583**	**–291**	**–6.3**	**1,110.0**	**1,113.0**	**1,110.03**
Azerbaijan	900	850	900	850	50	5.9	31.0	31.0	31.00
Croatia	16	15	16	16	–1	–3.4	5.0	5.4	5.03
Hungary	16	15	16	16	—	2.2	7.6	8.3	7.60
Kazakhstan	1,200	1,150	1,200	1,100	100	9.1	68.0	50.0	68.00
Romania	95	90	95	97	–2	–2.1	18.0	17.5	18.00
Russia	9,750	9,790	9,750	9,700	50	0.5	2,100.0	2,100.0	2,100.00
Other FSU	400	450	400	400	—	—	550.0	550.0	550.00
Other Eastern Europe	48	50	48	48	—	–0.9	18.9	20.2	18.93
Eastern Europe and FSU	**12,424**	**12,411**	**12,424**	**12,227**	**197**	**1.6**	**2,798.6**	**2,782.4**	**2,798.56**
Algeria[1]	1,400	1,400	1,400	1,340	60	4.5	285.0	285.0	285.00
Angola[1]	1,895	1,789	1,895	1,584	311	19.6	5.0	4.5	5.00
Cameroon	90	89	90	84	6	7.1	—	—	—
Congo (former Zaire)	20	20	20	20	—	—	—	—	—
Congo (Brazzaville)	240	240	240	240	—	—	—	—	—
Egypt	630	630	630	660	–30	–4.5	42.0	42.0	42.00
Equatorial Guinea	320	320	320	320	—	—	0.1	0.1	0.06
Gabon	230	230	230	230	—	—	0.3	0.3	0.31
Libya[1]	1,770	1,750	1,770	1,700	70	4.1	23.0	23.0	23.00
Nigeria[1]	2,060	2,100	2,060	2,280	–220	–9.6	70.0	72.0	70.00
Sudan	480	480	480	450	30	6.7	0.0	0.0	0.00
Tunisia	84	83	84	92	–8	–9.0	6.7	6.4	6.72
Other Africa	232	232	232	232	—	—	10.2	10.2	10.15
Africa	**9,450**	**9,363**	**9,450**	**9,232**	**218**	**2.4**	**442.2**	**443.4**	**442.24**
Bahrain	170	170	170	170	—	—	29.0	29.0	29.00
Iran[1]	4,050	3,940	4,050	3,900	150	3.8	245.0	245.0	245.00
Iraq[1]	2,220	2,350	2,220	1,700	520	30.6	4.0	4.5	4.00
Kuwait[1,2]	2,570	2,550	2,570	2,460	110	4.5	35.0	33.0	35.00
Oman	700	700	700	730	–30	–4.1	58.0	58.0	58.00
Qatar1	850	820	850	810	40	4.9	170.0	165.0	170.00
Saudi Arabia[1,2]	9,010	8,960	9,010	8,560	450	5.3	180.0	175.0	180.00
Syria	380	380	380	400	–20	–5.0	18.0	18.0	18.00
United Arab Emirates[1]	2,620	2,540	2,620	2,600	20	0.8	140.0	135.0	140.00
Yemen	320	320	320	360	–40	–11.1	—	—	—
Other Middle East	—	—	—	—	—	–65.0	11.5	10.1	11.52
Middle East	**22,890**	**22,730**	**22,890**	**21,690**	**1,200**	**5.5**	**890.5**	**872.6**	**890.52**
Australia	408	382	408	433	–25	–5.8	99.1	116.6	99.10
Brunei	169	177	169	186	–17	–9.2	36.9	34.9	36.93
China	3,778	3,616	3,778	3,822	–44	–1.1	229.5	210.2	229.55
India	686	683	686	688	–2	–0.3	83.8	88.6	83.77
Indonesia[1]	830	840	830	860	–30	–3.5	200.0	200.0	200.00
Japan	20	20	20	19	1	6.7	13.0	12.3	13.00
Malaysia	780	800	780	780	—	—	150.0	150.0	150.00
New Zealand	65	65	65	15	50	333.3	12.0	12.0	12.00
Pakistan	68	66	68	65	3	4.8	128.4	123.7	128.41
Papua New Guinea	10	5	10	50	–40	–80.0	1.0	0.5	1.00
Thailand	217	219	217	195	22	11.3	46.0	42.0	46.00
Viet Nam	300	300	300	330	–30	–9.1	15.0	13.0	15.00
Other Asia–Pacific	31	31	31	35	–4	–12.1	95.5	95.4	95.50
Asia Pacific	**7,362**	**7,203**	**7,362**	**7,478**	**–116**	**–1.5**	**1,110.3**	**1,099.2**	**1,110.25**
TOTAL WORLD	**73,162**	**72,865**	**73,162**	**72,356**	**805**	**1.1**	**9,284.4**	**9,262.9**	**9,284.40**
*OPEC	32,215	31,469	32,215	30,284	1,931	6.4	1,427.0	1,412.5	1,427.00
North Sea	4,021	4,120	4,021	4,299	–278	–6.5	740.0	742.1	740.04

[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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Market hostility a factor in global economic tremors

For global investors, turmoil in credit markets and economic deceleration aren't the only causes for worry. Political hostility toward market freedom in the US represents strong inducement not to expose capital to risk.

From the country that should lead the world in its commitment to robust markets come troubling signals of government intrusion.

The Editor's Perspective

by Bob Tippee, Editor

Democrats seeking their party's presidential nomination, for example, sound increasingly like socialists.

Sens. Hillary Clinton of New York and Barack Obama of Illinois would nationalize health care and extend the nationalization of energy choice that began with the Energy Policy Act of 2005—she by taxing oil to pay for government-sponsored energy, he by spending $150 billion of public money on uneconomic fuel.

They disparage the North American Free Trade Agreement and other manifestations of international commerce (see Clinton's recent tirade against the supposed menace of outsourcing).

And what about the tax increase that will clobber the US economy if rate cuts aren't extended in 2010? Under a President Clinton or Obama, it's a done deal.

Even before the presidential election, economic horror looms. As fast as it can, Congress is replacing economic energy with the other kind and, in one of history's grandest political lies, calling it a good deal for consumers. And the scale of economic sacrifice that Americans will be forced to make to their revved-up fears about global-warming remains undetermined.

Now private companies are on notice that politicians have a say in how much money they make and how they invest it.

That's the message from the House Select Committee on Energy Independence and Global Warming, the Democratic chairman of which on Apr. 1 lambasted oil-company profits for being too large and specific companies for not investing enough in renewable energy.

In yet another hearing in which politicians pretend to want yet refuse to listen to energy facts, Chairman Ed Markey of Massachusetts gave a new name to the current US approach to energy: the "renewable revolution."

That's cute but not descriptive. What's happening with energy aligns with a broader political assault on economic freedom and should be called what it is: swindle.

(Online Apr. 4, 2008; editor's e-mail: bobt@ogjonline.com)

Market Journal

by Sam Fletcher, Senior Writer

Quarter ends with bang

The fluctuation of crude futures prices on the New York Mercantile Exchange in March ended the first quarter of 2008 with a bang, said Paul Horsnell, Barclays Capital Inc., London. By Mar. 31, the average price for benchmark US light sweet crudes was $97.82/bbl, "the highest quarterly average ever and $39.60/bbl higher than the first quarter of 2007," Horsnell said.

As a result, nine investment banks increased their forecasts for average 2008 crude prices by $10/bbl or more, including three banks that raised their estimates by at least $20/bbl, in what may be "the largest shift in consensus ever seen in any single month," said Horsnell. "Over the course of the first quarter as a whole, the consensus forecast for the average of West Texas Intermediate in 2008 has shifted up by $14/bbl."

At the start of the quarter, he said, "$100/bbl was something that attracted massive media coverage based on the angle of how exceptionally high a price it was. By the end of the quarter, headlines such as 'Oil prices slump to $100' were becoming commonplace, i.e., $100 has already gone from being seen as high to being seen as a symptom of a weak market."

Tristone Capital Inc., Calgary, raised its oil price estimate to $100/bbl for 2008-09. The company expects forecasts of reduced economic growth to continue to diminish demand for fuel among members of the Organization for Economic Cooperation and Development, setting the stage for rebuilding global inventories in the second and third quarters of 2008. Yet the firm also expects continued demand growth in China and the Middle East to offset the slowdown among OECD countries.

With the US facing recession at a time of record high prices, OECD demand erosion might be more pronounced than envisaged. "With still-rising upstream costs and the inevitable layering of environmental controls, we see $80-90/bbl WTI prices necessary to support the growth in non-OPEC supply," said Tristone Capital analysts.

Positions liquidated

In a 2-week period through Apr. 4, speculators liquidated some 60,000 crude contracts on the New York futures market, partly to cover cash calls following the demise of Bear, Stearns & Co. Inc., the fifth largest US investment bank, said analysts at KBC Process Technology Ltd., Surrey, England.

In early March, the net long speculative position on NYMEX hit a record high of 192,000 contracts, pushing crude futures prices to record levels above $110/bbl. But because of the financial turmoil following Bear Stearns, crude futures prices fell back roughly $10/bbl. The May contract for benchmark US light, sweet crudes jumped by $2.40 to $106.23/bbl Apr. 4 on NYMEX.

KBC analysts said, "As US dollar exchange rates strengthened, speculators rushed to liquidate oil futures length to cover Bear Stearns." They said, "Speculative funds are expected to flow back into oil in April providing strong support to crude futures as continued US economic woes weigh on dollar exchange rates and equities. Also, further tightening in US gasoline stocks will lead to greater investor responses to refinery outages and other bullish headline news."

US gasoline inventories, which reached a 15-year high of 236 million bbl after an unprecedented 18 weeks of consecutive increases, fell by 12 million bbl in March as US refiners reduced runs to 82% of capacity, the lowest level since October 2005 after Hurricanes Katrina and Rita knocked out power and flooded refineries along the Gulf Coast. As a result, US gasoline production had declined by 500,000 b/d to 8.5 million b/d by the end of March.

The Energy Information Administration said commercial US crude inventories jumped 7.4 million bbl to 319.2 million bbl in the week ended Mar. 28. Gasoline inventories fell 4.5 million bbl to 224.7 million bbl in the same week. Distillate fuel stocks dropped 1.6 million bbl to 109.7 million bbl. NYMEX speculators focused their attention on the gasoline draw. "There is still a 22 million bbl year-on-year excess in US gasoline stocks, offset by shortfalls in crude (minus 11 million bbl) and distillate fuel (minus 10 million bbl)," said KBC analysts. "On balance, overall US oil stocks are more than adequate given an underlying drop in total demand of around 500,000 b/d. However, until stocks rise high enough to dampen the impact of headline news, speculators will be selective in their responses. Gasoline stocks will continue to be drawn down quite rapidly in the weeks ahead, providing support to speculative length."

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