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Our worldwide construction surveys are updated regularly

The PennEnergy editors and the OGJ Online Research Center are regularly conducting intensive survey efforts tracking new energy construction projects worldwide, keying the details into a spreadsheet and making them ready for your use!

Worldwide Construction Surveys

Semi-annual construction updates are provided in the following areas:

- Petrochemical
- Refining
- Pipeline
- Gas Processing
- LNG
- Sulfur

The Excel format enables efficient and rapid analysis of planned construction projects. The data collected includes Company, Location, Capacity, Expected Completion Date and Current Status, Contractor, Cost, Engineering and Process Design (when available). Some of these surveys are also available in historical version going back to 1996.

Production Projects Worldwide

Contains upstream projects in 47 countries, shows the development of individual fields, and the supporting infrastructure. The Survey in Excel spreadsheet identifies:

- country
- project name
- operator & company name
- project phase
- peak year
- development type details
- liquids and gas
- cost when available

Allows you to focus on what regions will have future growth, type of project, new discoveries, field redevelopment, stranded-gas projects, heavy-oil or deepwater projects and development of unconventional resources such as tight sands, shale gas, and coal bed methane gas.

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Planned Canadian Oil Sands development projects in four Excel worksheets. Includes: mining upgrading projects, in situ projects, reserves estimate of initial in-place bitumen, and historical table, commercial, experimental and exploration wells.

For more information

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OIL&GAS JOURNAL®

Apr. 6, 2009
Volume 107.13

WORLDWIDE CONSTRUCTION UPDATE

REGULAR FEATURES

COVER

Woodside Energy Ltd.'s Train 5 is the first onshore LNG processing train in the world to be designed and constructed in modular form. It is now fully operational and producing LNG for export. The Foster Wheeler-led joint venture delivered the 4.4-million tpy train at Karratha, Western Australia, on behalf of the North West Shelf Venture. Foster Wheeler was responsible for the engineering, procurement, and construction phase of the expansion. Details of other projects are in Oil & Gas Journal's Worldwide Construction Update starting on p. 22 and in the survey tables at www.ogjonline.com. Photo from Foster Wheeler/Woodside.

General Interest

Exploration & Development

Drilling & Production

Processing

Transportation

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Apr. 6, 2009

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General Interest — Quick Takes

SEC files charges in oil investment scheme

The US Securities and Exchange Commission charged a Los Angeles man and two of his companies with securities fraud on Mar. 24 and moved to halt their oil and gas investment sales.

The commission obtained an emergency court order from a federal district court in Los Angeles to freeze the assets of Clement Ejedawe, also known as Clement Chad, and his companies, Innova Energy LLC and Innova Leasing & Management.

SEC said in its complaint that Ejedawe and his companies raised $1.3 million from 30 investors by promising guaranteed returns on working interests in oil and gas leases or drilling equipment. In fact, it continued, the money was used to pay sales commissions; small amounts to complaining investors; and Ejedawe's personal expenses, including cash withdrawals, his apartment rent, and donations to his church.

The complaint said that since December 2006, the defendants solicited investors by cold-calling them from a Los Angeles boiler room where they said money would be invested in oil and gas lease or equipment working interests and promised monthly payments of $4,000-5,000 for every $50,000 invested.

SEC said that in their solicitations, representatives did not disclose that Ejedawe is the subject of at least seven separate cease-and-desist or desist-and-refrain orders relating to his unregistered offering of securities, including orders from California, Alabama, Pennsylvania, Maryland, Kansas, and Washington.

SEC said a hearing on whether a preliminary injunction will be issued against the defendants is scheduled for Apr. 6. It also is seeking permanent injunctions, disgorgement, and civil penalties against Ejedawe and the Innova entities.

Pence to lead GOP Energy Solutions Group

US House Republican Conference Chairman Mike Pence (Ind.) will chair the House GOP American Energy Solutions Group, House Minority Leader John A. Boehner (R-Ohio) said on Mar. 30.

The group will work on crafting Republican solutions to reduce energy prices for American families and small businesses, Boehner said.

"As gasoline prices skyrocketed to record levels last summer, Republicans consistently advocated an all-of-the-above strategy to create up to 1 million new jobs in the United States by increasing American energy production, encouraging greater efficiency and conservation, and promoting the use of alternative fuels," he said.

"Rep. Pence showed extraordinary leadership last summer during Republicans' historic [gasoline] price protects, and I know he is dedicated to developing solutions to keep energy costs affordable for all Americans," Boehner said.

He said that Reps. John Shimkus (Ill.) and Fred Upton (Mich.) will be cochairmen. Other members include Joe Barton (Tex.), ranking minority member of the Energy and Commerce Committee; Doc Hastings (Wash.), ranking minority member of the Natural Resources Committee; and Rob Bishop (Utah), who chairs the Western Caucus.

European gas demand increases by 2.1% in 2008

Preliminary figures and estimates brought out by the European Union of the Natural Gas Industry (Eurogas) indicate that total natural gas consumption in EU27 increased by 2.1% in 2008 over 2007 from 506.4 billion cu m (bcm) to 517 bcm. The total number of gas customers connected to the EU27 gas grid rose 1% to 112.5 million customers.

The largest gas consumers by far were in the UK where consumption rose to 101.8 bcm from 97.6 bcm in 2007; in Germany, where consumption fell to 85.1 bcm from 86 bcm in 2007; and in Italy, where consumption fell to 82.8 bcm from 82.9 bcm in 2007.

On a lower scale, consumption increased in France to 47.4 bcm from 45.8 bcm in 2007; in the Netherlands, up from 39.8 bcm to 41.4 bcm; Turkey to 36.1 bcm from 35.9 bcm; and in Switzerland to 3.3 bcm from 3.1 bcm.

Although natural gas markets vary significantly from one EU country to another, Eurogas believes some general trends may explain the overall increase. The main one is that the weather was mild in 2007 but rather cold in 2008 which, in addition, was a leap year of 366 days.

Overall the residential sector registered stable consumption resulting mainly from a trade-off between generally colder weather and energy savings. So the increase in gas consumption could be attributed to high demand in the power sector due to favorable gas prices compared with oil and coal. However, in all EU countries, there was a major slowdown in industrial demand in the last quarter due to the economic crisis.

Indigenous gas production increased 1.8% to 202 bcm over the period, pulled along by the Netherlands's 10.9% increase in production and Denmark's 9.4% hike, compensating for the downward trend in most other EU producing countries.

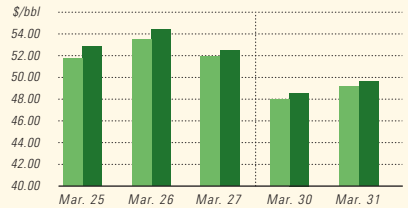
Indigenous production, nonetheless, covers the highest percentage of the gas supplied in the EU, covering 39% of the total net supplies in 2008. The main external sources are Russia 25%, Norway 18%, and Algeria 10%. Some 60% comes from fields in Western Europe.

EPA: Global warming a threat to public health

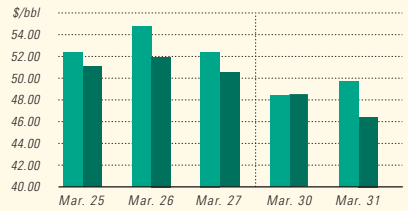
In an action that appears to boost prospects for a federal global warming emissions cap, the US Environmental Protection Agency reportedly sent a proposal to the White House on Mar. 20 determining that global warming is a threat to public health and wel-

Industry Scoreboard

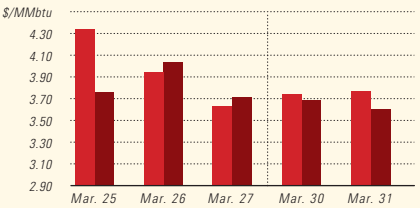
IPE BRENT / NYMEX LIGHT SWEET CRUDE



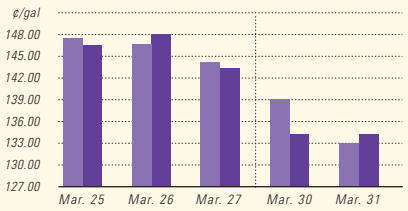
WTI CUSHING / BRENT SPOT



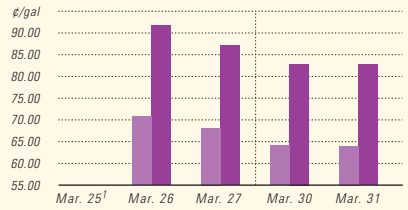
NYMEX NATURAL GAS / SPOT GAS - HENRY HUB



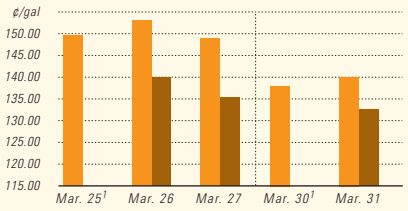
IPE GAS OIL / NYMEX HEATING OIL



PROPANE - MT. BELVIEU / BUTANE - MT. BELVIEU



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



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

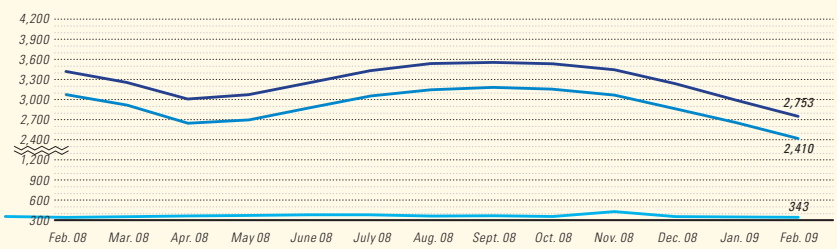
US INDUSTRY SCOREBOARD — 4/6

Latest week 3/20	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	9,058	8,996	0.7	8,919	8,908	0.1
Distillate	3,799	4,176	–9.0	4,024	4,209	–4.4
Jet fuel	1,456	1,534	–5.1	1,372	1,546	–11.3
Residual	593	565	5.0	586	672	–12.8
Other products	4,206	4,477	–6.1	4,542	4,631	–1.9
TOTAL DEMAND	19,112	19,748	–3.2	19,443	19,966	–2.6
Supply, 1,000 b/d						
Crude production	5,405	5,131	5.3	5,211	5,115	1.9
NGL production[2]	1,899	2,209	–14.0	2,168	2,180	–0.5
Crude imports	9,178	9,591	–4.3	9,488	9,744	–2.6
Product imports	3,239	2,953	9.7	3,186	3,144	1.3
Other supply[3]	1,554	1,412	10.1	1,478	984	50.2
TOTAL SUPPLY	21,275	21,296	–0.1	21,531	21,167	1.7
Refining, 1,000 b/d						
Crude runs to stills	14,234	14,509	–1.9	14,234	14,594	–2.5
Input to crude stills	14,612	14,726	–0.8	14,612	14,891	–1.9
% utilization	82.9	83.7	—	82.9	84.7	—

Latest week 3/20	Latest week	Previous week[1]	Change	Same week year ago[1]	Change	Change, %
Stocks, 1,000 bbl						
Crude oil	353,281	351,339	1,942	311,759	41,522	13.3
Motor gasoline	215,712	212,517	3,195	232,520	–16,808	–7.2
Distillate	145,516	145,404	112	113,490	32,026	28.2
Jet fuel–kerosine	40,229	41,564	–1,335	39,373	856	2.2
Residual	36,635	38,132	–1,497	37,939	–1,304	–3.4
Stock cover (days)[4]			Change, %		Change, %	
Crude	25.0	24.9	0.4	21.3	17.4	
Motor gasoline	23.9	23.6	1.3	25.6	–6.6	
Distillate	38.2	36.6	4.4	26.8	42.5	
Propane	26.3	25.6	2.7	18.1	45.3	
Futures prices[5] **3/27**			Change		Change	%
Light sweet crude ($/bbl)	49.46	45.68	3.78	109.42	–59.96	–54.8
Natural gas, $/MMbtu	3.95	3.89	0.06	10.03	–6.08	–60.6

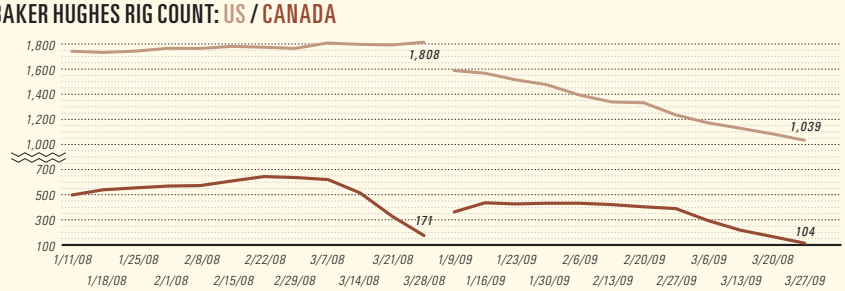
[1]Based on revised figures. [2]Includes adjustments for fuel ethanol and motor gasoline blending components. [3]Includes other hydrocarbons and alcohol, refinery processing gain, and unaccounted for crude oil. [4]Stocks divided by average daily product supplied for the prior 4 weeks. [5]Weekly average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

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



Note: Monthly average count

BAKER HUGHES RIG COUNT: US / CANADA



Note: End of week average count

fare, US Rep. Edward J. Markey (D-Mass.) said on Mar. 23.

"This finding will officially end the era of denial on global warming," Markey said. "Instead of allowing political interference in scientific and legal decisions, as was the case in the previous administration, the Obama administration is letting the sun shine in on the dangerous realities of global warming," added Markey, who chairs the US House Select Committee on Energy Independence and Global Warming.

An EPA spokeswoman confirmed the proposal's existence and its delivery to the White House, but said it was an internal document, which the agency developed in response to a US Supreme Court directive.

"If the proposal is issued, it will undergo public comment and public hearings before it becomes final. The document does not propose any requirements on any sources of greenhouse gas emissions. The proposed finding does not impose any new regulatory burdens on any projects, let alone those funded under the American Relief and Recovery Act," she said.

Markey, however, said that he and Energy and Commerce Committee Chairman Henry A. Waxman (D-Calif.) are drafting climate and energy legislation to control emissions that cause global warming, and an endangerment finding by EPA would send a strong signal to companies and industries pumping heat-trapping pollution into the atmosphere that they will have to curb such emissions. ✦

Exploration & Development — *Quick Takes*

ExxonMobil to probe Orinoco trend in Llanos

ExxonMobil Corp. plans to begin exploring an extension of Venezuela's Orinoco heavy oil belt in far eastern Colombia in 2009.

The company in 2008 was awarded a technical evaluation agreement on Block CPE-3 covering 6.4 million acres in a remote and unexplored area of the eastern Llanos basin on trend with the Orinoco belt.

Exploration is to start with 2D seismic surveys. This region is 400 miles east-northeast of Bogota and almost as far south-southwest of Caracas.

Noble Energy discovers more gas off Israel

Noble Energy Inc. discovered natural gas at the Dalit prospect 30 miles off Israel on the Michal license with a well drilled to 12,000 ft in 4,500 ft of water.

Formation logs identified more than 110 ft of net pay in a high-quality reservoir. Dalit is Noble's second subsalt, lower-Miocene discovery in the Levantine basin.

Production testing will be performed at Dalit after the well is completed. Subsequent to testing, the rig will return to the Tamar discovery in the Matan license to drill an appraisal well designed to better define Tamar (OGJ, Feb. 9, 2009, p. 39).

Charles D. Davidson, Noble Energy's chairman, president, and chief executive officer, said Noble Energy plans to start its production from this new region in 2012.

"Based on results from the seismic program, we could see further exploration in the region starting in the second half of 2010," Davidson said.

Noble Energy operates both the Michal and Matan licenses with a 36% working interest. Other interest owners are Isramco Negev 2 with 28.75%, Delek Drilling with 15.625%, Avner Oil Exploration with 15.625%, and Dor Gas Exploration with 4%.

Maurel & Prom discovers oil in Gabon

Maurel & Prom, Paris, reports the OMOC-1 well on the Omoueyi permit in southern Gabon on test stabilized at 1,000 b/d of oil from an 11 m interval in the Cretaceous Gas de Base formation, confirming the permit's potential and reinforcing exploration efforts. The well targeted the Kissenda and Base sandstones, which produce oil at Omko and Onal, respectively.

Pay thicknesses are 40 m in the Kissenda and 14 m in the Base. Maurel & Prom is testing a 6-m interval in the lower Kissenda formation and plans to test a 24-m interval in the upper Kissenda.

OMOC-1 reached a depth of 1,020 m. The well is south of the Onal production permit and 9 km from the production center.

Maurel & Prom also reported that its Mafia Deep-1 well in Tanzania is not a commercial gas discovery at this stage.

Gas plugs were found at 3,950 m, and the well currently is 4,914 m deep. After reprocessing seismic data, the company said the well's main objective is expected in about 150 m, representing 10 days under normal drilling conditions.

"The sandstone beds that may be the origin of the gas breakthroughs observed total approximately 20 m," it added.

Lundin buys into Krabbe discovery

Lundin Petroleum AB has acquired from Talisman Energy Norge AS a 40% interest in production license 301 north of Ula field in the southern North Sea. The license holds the undeveloped Krabbe oil discovery.

The value of the transaction was not disclosed. This transaction is subject to government approval.

Lundin plans to tie in Krabbe and its nearby Nemo discovery in PL148 to existing nearby facilities as a subsea development so it can improve efficiency and lower development costs. "The two discoveries are of similar type and size," Lundin said. ✦

Drilling & Production — *Quick Takes*

Alve gas field begins production

Alve gas and condensate field in the Norwegian Sea began production Mar. 19.

Alve's 1990 discovery led to the discovery of Norne oil and gas field, which was proved in 1992 and brought on stream in 1997. Alve, which had been temporarily plugged, was later developed as a subsea satellite field tied back to Norne field's production vessel. Gas from Alve will be exported through Norne pipeline systems.

"Output from Alve and other finds in the area will extend Norne's lifetime from 2016 to 2021. This will provide more

spinoffs for land-based activities in the north of Norway," said Anita A. Stenhaug, vice-president of Norne operations.

"Alve is a pilot project for submitting a simplified plan for development and operation for satellite fields," said Kjell Helge Eide, manager for the development project. "This procedure has now been adopted in development projects for other such fields."

Alve is in production license Block 159B, about 16 km southwest of Norne. The field embraces the Garn, Not, Ile, and Tilje formations. Proved reserves are in Garn and Not.

Alve is expected to produce 4 million cu m/day of gas. Reserves are estimated at 6.78 billion cu m of gas and 8.3 million bbl of condensate.

The Alve licensees are operator StatoilHydro 85% and Dong E&P Norge 15%.

BP awards Caspian Sea Chirag project contract

BP PLC, on behalf of Azerbaijan International Oil Co., awarded KBR Inc. a front-end engineering and design (FEED) contract for the Chirag oil project in the Azerbaijan section of the Caspian Sea.

The Houston-based engineering, construction, and services company will provide FEED and procurement support services for a single, large drilling platform that will tie in to existing Azeri-Chirag-Gunashli (ACG) oil field development platforms and pipeline systems.

This is the next stage in the Chirag oil project development, including incremental expansion of existing ACG field development.

KBR has been involved with the development of the ACG project since 1995. Work on the project is under way.

E.On starts production from Rita gas field

E.On Ruhrgas UK North Sea Ltd. has started natural gas production from Rita field in the UK North Sea via a subsea development tied back to Hunter field, which the company operates.

E.On Ruhrgas did not disclose Rita's likely output. The field is connected to Hunter by a 14-km pipeline. This is the first time a dual lateral well was drilled in a Carboniferous reservoir in the southern gas basin, the company said.

"Each leg was drilled as a 6-in. hole and has a horizontal length of more than 800 m. Gas is exported via the CMS infrastructure to the Theddlethorpe gas terminal on the UK's east coast, where the gas is supplied to the UK market," said E.On Ruhrgas.

Rita field lies on Blocks 44/21b and 44/22c. E.On Ruhrgas UK operates the Rita field and has a 74% equity share. Coventure partner Gaz de France Suez E&P UK Ltd., meanwhile, holds a 26% share.

Development approval for Rita was granted in early 2008. ✦

Processing — *Quick Takes*

Kuwait cancels fourth refinery at Al Jour

Kuwait Prime Minister Sheikh Nasser Mohammad al-Ahmad al-Sabah reported that the country has canceled plans to build a 630,000 b/d fourth refinery at Al Jour on the Persian Gulf coast near the Saudi Arabia border. He said an Audit Bureau study deemed the project unfeasible.

The refinery, earlier expected to cost $10 billion but later raised to $15 billion and rebid, had been scheduled to start in 2013 (OGJ, Nov. 12, 2007, p. 32).

Work on the grassroots refinery, which would have produced low-sulfur fuel oil for the country's power plants, was officially halted at the council of ministers' Mar. 23 meeting after contractors had been notified.

Kuwait National Petroleum Co. had awarded engineering, procurement, and construction contracts in May 2008 to four South Korean companies and a Japanese firm. Fluor Corp. was project manager and front-end engineering and design consultant, and Foster Wheeler was the feasibility study consultant. Fluor said it was notified Mar. 20 of its contract cancellation. It will reassign the 300 engineers working on the project.

The other contractors notified included Hyundai Engineering & Construction, which had a contract for $1.12 billion for offshore facilities; a consortium of Japan's JGC Corp. and Korea's GS Engineering & Construction, $4 billion for main unit construction; Daelim Industrial, $1.184 billion; and SK Engineering & Construction, $2.06 billion. GS Engineering was to have provided equipment.

The project was referred to the Audit Bureau for investigation in August following allegations by opposition members of Parliament (MPs) that the bidding process was flawed and that the contracts should have been awarded through the state-run Central Tenders Committee (CTC) to ensure transparency.

The outcome of their report was not published, but local media and MPs said the bureau concluded that the project was "technically and economically not feasible" and that future such project tenders should go through the CTC.

This is the second refinery proposal the country has scrapped in 4 months. In December, Kuwait dropped plans for a $7.5 billion partnership with US Dow Chemical after pressure from MPs, which cited "high cost amid the global economic downturn."

France struggles to meet 10% ethanol deadlines

The introduction in all service stations in France of the new "green" unleaded gasoline, incorporating 10% ethanol instead of the current 5%, will take longer than initially expected.

However, Jean-Louis Schilansky, president of the oil trade group UFIP, told a press conference held Mar. 24 to launch the E10 that 75% of France's service station network should be selling it by yearend.

The pace will be consistent with the logistic and technical problems encountered by oil company operators, independents, and supermarkets. Ethanol must be moved by truck rather than by pipeline; existing oil depots and service station tanks must be adapted to the new unleaded; and service stations must either sacrifice one pump to deliver it or, if a large service station, use one that was used to deliver other unleaded gasolines.

While BP retained its own depots when it sold its Lavera refinery and will be able to have all its service stations ready with E10 by the end of April, Shell has no access to any depots. It sold its three refineries last year and relies on the speed at which the new owners

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can accommodate its needs.

Total expects to have some 300 service stations delivering E10 the first fortnight in April and will progressively have all of its 4,000 service stations in France ready during the year.

Esso also will gradually have its service stations ready but doesn't know how long it will take to deal with its own technical problems.

All four companies told OGJ they are keen and willing to deliver the "green" unleaded. They could refuse to do so but would have to pay a polluting tax instead.

The E10 can be used only by automobiles sold after 2000 and will only be really profitable for drivers when prices at the pump are higher than they are now. The price difference currently is only 1-2¢/l., if at all, as drivers need more E10 to travel the same distance as vehicles using normal unleaded fuel.

The government's purpose in introducing the E10 at least 5 years ahead of the EU is that is should reduce carbon dioxide emissions in France by 1 million tonnes/year by 2010. ✦

Transportation — *Quick Takes*

Cove Point LNG terminal starts up expansion

Dominion subsidiary Dominion Cove Point LNG, Richmond, Va., recently started up its 1.8-MMcfd expansion of the terminal on the Maryland shore of Chesapeake Bay.

The company said the project expands the terminal capacity by 80% and LNG storage capacity by nearly 100% to 14.6 bcf (equivalent).

New facilities include:

- Two 160,000-cu m LNG storage tanks.
- Increased vaporization and associated station facilities adding 800 MMcfd.
- An 81-mile, 24-in. OD pipeline in central Pennsylvania and associated facilities that allow imported natural gas to move to US Northeast natural gas markets.
- A 48-mile, 36-in. OD gas pipeline loop in Maryland that increases pipeline capacity from the terminal.
- Two new compressor stations near Perulack and State College, Pa.
- Various natural gas storage facilities and pipelines that move natural gas to Dominion's South Point market hub, other interstate pipelines, and the Leidy, Pa., interconnection with Transcontinental Gas Pipeline.

A subsidiary of StatoilHydro ASA has contracted for all the new capacity, including firm transportation and storage services in Pennsylvania, said Dominion. The previously existing capacity was already under contract.

Sakhalin Energy exports first LNG cargo to Japan

Sakhalin 2 has sent its first LNG cargo to Japan via Energy Frontier LNG carrier for delivery at Tokyo Bay. The cargo holds 45,000 cu m for Tokyo Gas and Tokyo Electric.

The LNG was loaded through the 805-m-long jetty at the Prigorodnoye port, which was built for the year-round export of LNG and oil.

"Russia has marked its entry into the Asia-Pacific LNG market," said Sakhalin Energy Chief Executive Officer Ian Craig.

The first train at the 9.6 million tonne/year liquefaction complex has begun production, and the second train is scheduled to come on stream later this year.

"This year and 2010 will see a gradual ramp-up to full production capacity," said Sakhalin Energy. "The newly built Sakhalin II infrastructure includes three offshore platforms, an onshore processing facility, 300 km of offshore pipelines and 1,600 km of onshore pipelines, an oil export facility, and the LNG plant."

Sakhalin's LNG will serve consumers in Japan, Korea, and other markets.

Shareholders in Sakhalin Energy are Gazprom with 50% plus 1 share, Royal Dutch Shell PLC with 27.5% minus 1 share, Mitsui & Co. Ltd. 12.5%, and Mitsubishi Corp. 10%.

Dutch terminal to double fuel imports to Moldova

Netherlands-based EasEur Holding, owner of Moldova's sole oil products import terminal, expects shipments through the facility at Giurgiulesti to double to 30,000 tonnes this year from the 14,899 tonnes shipped in 2008.

EasEur Vice-Pres. Thomas Moser expressed satisfaction with development of the terminal's operations this year. He said the firm has invested $27 million in the terminal, which became operational in August, yielding eight tanks with a combined storage capacity of 63,600 tonnes.

Moser said EasEur Holdings expects a number of storage tanks at the facility to be leased out to international oil trading companies in the coming months.

The terminal's first incoming shipment last August was 4,000 tonnes of Euro diesel from the Motor Oil Hellas refinery in Greece.

All products shipped by the terminal in 2008 were delivered to EasEur Holding's 23 filling stations in Moldova, according to the economy ministry, which said that EasEur Holding plans to build a total of 50 filling stations in the country.

Construction of the terminal was launched in 2006 by Azpetrol SRL, Azpetrol Refinery SRL, and Azertrans SRL—the three Moldovan subsidiaries of Azeri oil company Azpetrol.

In June 2006 EasEur Holding, a subsidiary of Eastern Capital NV, acquired the three Azpetrol subsidiaries and renamed them Bemol Retail, Bemol Refinery, and Danube Logistics.

Earlier this month, Moldova energy regulator ANRE said the country's imports of oil products, including diesel fuel and gasoline, last year rose by 3.4% to 565,000 tonnes and by value increased by 45.4% to $531.5 million.

Imports of diesel fuel rose by 5.2% to 350,000 tonnes/year, while the volume of gasoline imports rose by 0.7% to 215,200 tonnes/year, ANRE said. It said Moldova's LPG imports, which were not included in the overall import figures, grew by 19% in 2008 to 60,100 tonnes. ✦

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Letters

If Atlas shrugged

As an oil executive and an American, I also find the course being pursued in Washington, DC, to be energy suicide (OGJ, Mar. 9, 2009, p. 68). I think it's time for Atlas to shrug.

I see Transocean is moving corporate headquarters to Switzerland, and Noble is reincorporating there and considering a transfer of management. Maybe if ExxonMobil notifies Washington that it will not be able to flourish under this lunacy and will have to cease being a US-based company, they'll get it.

Jerry Rothouse
Austin

CNG vehicles have niche

Re: Nick Snow's fine reporting of Sen. Harry Reid's press conference on compressed natural gas (CNG) vehicles (OGJ, Mar. 2, 2009, p. 28).

Our family owns and operates a 2004 Honda natural gas vehicle (NGV). We love the car for its low operating costs and its low local emissions. While natural gas burns clean, the exploration, production, and transportation require liquid hydrocarbons and coal; NGVs only displace some of the pollution. Also, since our NGV has only a 200 mile range, my wife typically refuels it every 2-3 days and rarely strays far from the limited refueling stations. The fuel economy (about 30 mpg) is less than a comparably sized Jetta Diesel (about 40 mpg), and the expensive 3,600 psi tank has a life expectancy of only 15 years.

We are also investors in oil and gas exploration, drilling, and production—investments with minimal return for the risk, particularly at the present low prices. Our partners have had little success in finding large gas fields, not surprising when peak natural gas production in the lower 48 states occurred 35 years ago (1973). Based on this and on what I understand about the short lives of shale wells, I cannot be optimistic about long-term supply.

NGVs have a niche to displace diesel and gasoline in local transportation: bus-

es, trucks, and fleet vehicles that never stray far from a filling station and can be filled overnight in their fleet garages, so as not to overload the present infrastructure. Adding additional infrastructure to fuel large fleets of NGVs may prove wasteful and uneconomical if the supply is not adequate for the next 30 years. Remaining large sources of natural gas are in unfriendly countries and would have to be imported as LNG.

Decision-makers need to consult both with people who have expertise and experience in the day-to-day operation of NGVs and with natural gas supply specialists to intelligently determine the wisdom of large-scale expansion of the NGV fleet.

Richard J. McDonald, PhD (physics)
San Francisco

Calendar

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

OIL&GAS JOURNAL online

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

2009

APRIL

SPE Production and Operations Symposium, Oklahoma City, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 4-8.

SPE Digital Energy Conference, Houston, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 7-8.

ATYRAU Regional Oil & Gas Exhibition & OilTech Kazakhstan Petroleum Technology Conference, Atyrau, +44 (0) 207 596 5233, +44 (0) 207 596 5106 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.oilgas-events.com. 7-9.

GPA Mid-continent Annual Meeting, Oklahoma City, (918) 493-3872, (918) 493-3875 (fax), website: www.gasprocessors.com. 16.

Middle East Petroleum & Gas Conference, Dubai, 65 6338 0064, 65 6338 4090 (fax), e-mail: info@cconnection.org, website: www.cconnection.org. 19-21.

ERTC Coking & Gasification Conference, Budapest, 44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. 20-22.

Hannover Messe Pipeline Technology Conference, Hannover, +49 511 89 31240, +49 511 89 32626 (fax), website: www.hannovermesse.de. 20-24.

IADC Drilling HSE Middle East Conference & Exhibition, Abu Dhabi, (713) 292-1945, (713) 292-1946 (fax), e-mail: conferences@iadc.org, website: www.iadc.org. 21-22.

API Pipeline Conference, Fort Worth, Tex., (202) 682-8000, (202) 682-8222 (fax), website: www.api.org. 21-22.

Pipeline Transport Conference & Exhibition, Moscow, +43 1 230 85 35 33, website: www.expopipeline.com. 21-23.

Base Oils and Lubricants in Russia & CIS Conference, Moscow, +44 (0) 1242 529 090, +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. 22-23.

Instrumentation Systems Automation Show & Conference, (ISA), Calgary, Alta., (403)

Calendar

209-3555, (403) 245-8649 (fax), website: www.petroleumshow.com. 22-23.

CPS/SEG International Geophysical Conference & Exposition, Beijing, (918) 497-5500, (918) 497-5557 (fax), e-mail: semery@seg.org, website: www.seg.org. 24-27.

AIChE Spring National Meeting, Tampa, (203) 702-7660, (203) 775-5177 (fax), website: www.aiche.org. 26-30.

API Spring Refining and Equipment Standards Meeting, Denver, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org. 27-29.

EAGE European Symposium on Improved Oil Recovery, Paris, +31 88 995 5055, +31 30 6343524 (fax), e-mail: eage@eage.org, website: www.eage.org. 27-29.

ENTELEC Conference & Expo, Houston, (972) 929-3169, (972) 915-6040 (fax), e-mail: blaine@entelec.org, website: www.entelec.org. Apr. 29-May 1.

MAY

EAGE International Petroleum Conference & Exhibition, Shiraz, +31 88 995 5055, +31 30 6343524 (fax), e-mail: eage@eage.org, website: www.eage.org. 4-6.

Offshore Technology Conference (OTC), Houston, (972) 952-9494, (972) 952-9435 (fax), e-mail: service@otcnet.org, website: www.otcnet.org. 4-7.

GPA Permian Basin Annual Meeting, Austin, (918) 493-3872, (918) 493-3875 (fax), website: www.gasprocessors.com. 5.

Interstate Oil and Gas Compact Commission Midyear Meeting (IOGCC), Anchorage, (405) 525-3556, (405) 525-3592 (fax), e-mail: iogcc@iogcc.state.ok.us, website: www.iogcc.state.ok.us. 10-12.

ERTC Asset Maximisation Conference, Prague, 44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. 11-13.

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

IADC Environmental Conference & Exhibition, Stavanger, (713) 292-1945, (713) 292-1946 (fax), e-mail: conferences@iadc.org, website: www.iadc.org. 12-13.

North American Unconventional Oil & Gas Conference & Exposition, Denver, (403) 209-3555, (403) 245-8649 (fax), website: www.petroleumshow.com. 12-13.

NPRA National Safety Conference, Grapevine, Tex., (202) 457-0480, (202) 457-0486 (fax), e-mail: info@npra.org, website: www.npra.org. 12-13.

International School of Hydrocarbon Measurement, Norman, Okla., (405) 325-1217, (405) 325-1388 (fax), e-mail: lcrowley@ou.edu. Website: www.ishm.info. 12-14.

Uzbekistan International Oil & Gas Exhibition & Conference, Tashkent, +44 (0) 207 596 5233, +44 (0) 207 596 5106 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.oilgas-events.com. 12-14.

Pipeline Simulation Interest Group (PSIG) Meeting, Galveston, Tex., + 966 3 873 0139, + 966 3 873 7886 (fax), e-mail: info@psig.org, website: www.psig.org. 12-15.

Iraq Oil + Gas Summit, Houston, (202) 536-5000, (202) 280-1239 (fax), e-mail: lwilson@nfemail.com, website: www.New-Fields.com. 13-14.

✦Louisiana Oil and Gas Symposium, Baton Rouge, (225) 578-8657, (225) 578-9257 (fax), e-mail: hammer@lsu.edu, website: www.brgs.la.org. 19-20.

NPRA Reliability & Maintenance Conference, Grapevine, Tex., (202) 457-0480, (202) 457-0486 (fax), e-mail: info@npra.org, website: www.npra.org. 19-22.

IADC Drilling Onshore Conference & Exhibition, Houston, (713) 292-1945, (713) 292-1946 (fax), e-mail: conferences@iadc.org, website: www.iadc.org. 21.

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

APPEA Conference & Exhibition, Darwin, +61 7 3802 2208, e-mail: jhood@appea.com.au. website: www.appea2009.com.au. May 31-Jun. 3.

SPE Latin American and Caribbean Petroleum Engineering Conference, Cartagena, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. May 31-Jun. 3.

JUNE

Caspian International Oil & Gas/Refining & Petrochemicals Exhibition & Conference, Baku, +44 (0) 207 596 5233, +44 (0) 207 596 5106 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.oilgas-events.com. 2-5.

Asia Oil & Gas Conference, Kuala Lumpur, 65 62220230, 65 62220121 (fax), e-mail: info@cconnection.org, website: www.cconnection.org. 7-9.

AAPG Annual Meeting, Denver, (918) 560-2679, (918) 560-2684 (fax), e-mail: convene@aapg.org, website: www.aapg.org. 7-10.

PIRA Scenario Planning Conference, Houston, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 8.

ILTA Annual International Operating Conference & Trade Show, Houston, (202) 842-9200, (202) 326-8660 (fax), e-mail: info@ilta.org, website: www.ilta.org. 8-10.

International Oil Shale Symposium, Tallinn, Estonia, +372 71 52859, e-mail: Rikki.Hrenko@energia.ee, website: www.oilshalesymposium.com. 8-11.

SPE EUROPEC/EAGE Conference and Exhibition, Amsterdam, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 8-11.

PIRA Understanding Global Oil Markets Seminar, Houston, (212) 686-6808, (212) 686-6628 (fax), website: www.pira.com. 9-10.

GO-EXPO Gas and Oil Exposition, Calgary, Alta., (403) 209-3555, (403) 245-8649 (fax), website: www.petroleumshow.com. 9-11.

Petro.t.ex Africa Exhibition & Conference, Johannesburg, +27 21 713 3360, +27 21 713 3366 (fax), website: www.fairconsultants.com. 9-11.

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.

ASME Turbo Expo, Orlando, (973) 882-1170, (973) 882-1717 (fax), e-mail: infocentral@asme.org, website: www.asme.org. 13-17.

Society of Petroleum Evaluation Engineers (SPEE) Annual Meeting, Santa Fe, NM, (713) 286-5930, (713) 265-8812 (fax), website: www.spee.org. 14-16.

PIRA London Energy Conference, London, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 15.

IPAA Midyear Meeting, Dana Point, Calif., (202) 857-4722, (202) 857-4799 (fax), website: www.ipaa.org. 15-17.

PIRA Scenario Planning Conference, London, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 16.

Atlantic Canada Petroleum Show, St. John's, Newfoundland & Labrador, 403) 209-3555, (403) 245-8649 (fax), website: www.petroleumshow.com. 16-17.

IADC World Drilling Conference & Exhibition, Dublin, (713) 292-1945, (713) 292-1946 (fax), e-mail: conferences@iadc.org, website: www.iadc.org. 17-18.

PIRA Understanding Global Oil Markets Seminar, London, 44 1493 751 316, e-mail: miles@pira.com, website: www.pira.com. 17-18.

AAPL Annual Meeting, Clearwater Beach, Fla., (817) 847-7700, (817) 847-7704 (fax). e-mail: aapl@landman.org, website: www.landman.org. 17-20.

IAEE International Conference, San Francisco, (216) 464-2785, (216) 464-2768 (fax), website: www.usaee.org. 21-24.

Society of Professional Well Log Analysts Annual Symposium (SPWLA), The Woodlands, Tex., (713) 947-8727, (713) 947-7181 (fax), website: www.spwla.org. 21-24.

SPWLA Annual Symposium, The Woodlands, Tex., (713) 947-8727, (713) 947-7181 (fax), e-mail: webmaster@spwla.org, website: www.spwla.org. 21-24.

International Offshore and Polar Engineering Conference (ISOPE), Osaka, (650) 254-1871, (650) 254-2038 (fax), e-mail: meetings@isope.org, website: www.isope.org. 21-26.

Asia LPG Seminar, Singapore, (713) 331-4000. (713) 236-8490 (fax), website: www.purvingertz.com. 22-25.

API Exploration & Production Standards Oilfield Equipment and Materials Conference, Westminister, Colo., (202) 682-8000, (202) 682-8222 (fax), website: www.api.org. 22-26.

Moscow International Oil & Gas Exhibition (MIOGE) & Russian Petroleum & Gas Congress, Moscow, +44 (0) 207 596 5233, +44 (0)

207 596 5106 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.oilgas-events.com. 23-26.

JULY

Rocky Mountain Energy Epicenter Conference, Denver, (303) 228-8000, e-mail: conference@epicenter2008.org, website: www.denvercon-vention.com. 7-9.

API Offshore Crane Operations and Safety Conference, Houston, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org. 14-15.

Oil Sands and Heavy Oil Technologies Conference & Exhibition, Calgary, Alta., (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.oilsandstech-nologies.com. 14-16.

AUGUST

SPE Asia Pacific Health, Safety, Security and Environment Conference and Exhibition, Jakarta, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 4-6.

SPE Asia Pacific Oil and Gas Conference and Exhibition, Jakarta, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 4-6.

EnerCom's The Oil & Gas Conference, Denver, (303) 296-8834, email: kgrover@enercominc.com, website: www.theoilandgasconference.com. 9-13.

Oil Sands and Heavy Oil Technologies Conference & Exhibition, Calgary, Alta., (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.oilsandstech-nologies.com. 14-16.

ACS Fall National Meeting & Exposition, Washington, (202) 872-4600, e-mail: service@acs.org, website: www.acs.org. 16-20.

IADC Well Control Conference of the Americas & Exhibition, Denver, (713) 292-1945, (713) 292-1946 (fax), e-mail: conferences@iadc.org, website: www.iadc.org. 25-26.

Summer NAPE, Houston, (817) 847-7700, (817) 847-7704 (fax), e-mail: info@napeexpo.com, website: www.napeonline.com. 27-28.

SEPTEMBER

Oil & Gas Maintenance Technology North America Conference, New Orleans, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.ogmtna.com. 1-3.

Journally Speaking

Oil, gas, and social media

Steven Poruban
Senior Editor

A recent survey has found that while oil and gas industry professionals may view certain social media tools—such as networking web sites, instant messaging, text messaging, wikis, blogs, and podcasts—as important for improving productivity and collaboration, few companies currently have tools in place to successfully benefit from these electronic tools' potential efficiencies.

The survey, entitled Oil & Gas collaboration Survey 2009, was released jointly in mid-February by Accenture and Microsoft Corp. and was conducted by PennEnergy in partnership with the Oil & Gas Journal Research Center.

The survey found that while 40% of industry professionals polled thought that company adoption of new social media tools, including social networking web sites, would boost on-the-job productivity, only one in four of those surveyed reported actually leveraging these newer tools to capture and share vital information internally.

Old vs. new

Survey respondents included a worldwide pool of industry engineers, geoscientists, and business managers. The survey found that despite more than 70% of those polled believing that collaboration and knowledge-sharing were important for driving revenue, cutting costs, and contributing to the health and safety of workers, most respondents stated that their organizations are still using older means of collaboration, such as face-to-face meetings, e-mails, and conference calls.

"Perhaps more telling is that 61% of respondents said they spend at least 1 hr each working day searching for information and knowledge sources necessary for their jobs," the survey reported. "With an estimated 65,000 engineering professionals in the global oil and gas industry today, this translates into a potential loss of almost 10 million people-hr/year among engineers alone, an average net annual loss of $485 million for the industry, calculated according to US Department of Labor salary statistics," the survey said.

Craig Hodges, US energy and chemicals industry solutions director at Microsoft, noted, "During this time of economic upheaval, when every dollar counts and effective decision-making is crucial, new technologies such as social media tools can help oil and gas industry professionals find information, collaborate, and generally be more productive." Hodges said, "In an environment with fewer workers and less resources, this is incremental productivity our industry can use in finding new reserves, improving execution of capital projects, driving new innovations, and reducing costs."

Survey results

Finding ways to facilitate knowledge-sharing and capture topped the list of concerns among survey respodents. "Survey respondents confirmed that concerns about capturing knowledge from experienced workers before they retire or leave the company is prevalent," the survey said.

Claire Markwardt, senior executive with Accenture's energy practice, said, "Companies are dealing with several trends right now, not only the aging workforce walking out the door with decades of knowledge, but also experienced hires coming into their businesses who need to understand a new corporate culture."

Markwardt added, "Companies have an opportunity to supplement their existing collaboration capabilities with newer tools such as podcasts and social networks to accelerate the sharing of knowledge, increase teaming, and augment communication between their workforces in different regions."

Survey respondents stated that the tools primarily used to retain knowledge and intellectual capital from retiring workers are mainly older methods, including electronic file shares, 64%, databases or repositories, 58%, and written documents and physical files, 58%. "In fact," the survey said, "almost a quarter of respondents reported exit interviews as the tool used most often to capture knowledge from these workers."

Respondents overwhelmingly said new collaboration technologies can help stem the flow of exiting knowledge. When asked which of the social media tools would be most beneficial for this task, respondents said: internet portals, 81%; social networking web sites, 58%; video or photo sharing, 56%; blogs or mini-blogs, 44%; and wikis, 43%.

"While more than half the respondents favored adopting social media technologies to help shrink the productivity gap, only 37% of respondents think their companies are prepared or very prepared to facilitate enhanced sharing and capturing of the company's intellectual capital," the study said.

When asked why, 48% of the respondents said company management didn't view these issues as a problem. "And 44% laid responsibility for lack of readiness on older workers who do not typically use digital knowledge-sharing capabilities," the study said.

Full survey methodology and results are available at www.microsoft.com/oilandgas. ✦

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StatoilHydro

Editorial

Stopping the juggernaut

For anyone in the oil and gas industry, the spectacle of an American president sacking the head of General Motors should be chilling. The episode says much about Barack Obama and the radicalism he brings to the presidency. He believes in governmental control of free enterprise. He acts eager to test at least the political limits of executive authority. And, as the federal budget he proposed to Congress shows, he dislikes the oil and gas business.

Whether Rick Wagoner needed to be ousted as GM's chief executive is not the question here. The question is whether the president of the United States, and not the owners of the company, should make and execute the decision. The answer is no.

Who owns GM?

Obama leads a government to which GM is disastrously indebted. But neither he nor his government owns the company. The president used the government's status as emergency creditor to arrogate prerogatives of corporate ownership. This is supremely alarming.

For the oil and gas business, politicization of GM is not just some other industry's misfortune. In his Mar. 30 announcement of plans for GM and Chrysler, Obama said: "I am absolutely committed to working with Congress and the auto companies to meet one goal: The United States of America will lead the world in building the next generation of clean cars."

GM thus is to become the instrument by which the government will try to override markets and steer US fuel consumption away from petroleum. In perfect harmony with that strategy on the demand side of the market is Obama's Mar. 31 signing of a lands bill that forecloses oil and gas supply from 2 million acres. Except for the early rejection of windfall profit taxation, every policy initiative on energy from the Obama administration aligns with the off-oil manifesto of environmental extremism.

Obama has made this veer toward btu bankruptcy part of a risky, state-centered makeover of the economy, the prospective debt from which has alarmed even members of his own political party. And he predicates this liberal blitz on beliefs made clear by pronouncements like this one, from a Mar. 24 press conference: "If we don't tackle energy, if we don't improve our education system, if we don't drive down the costs of health care, if we're not making serious investments in science and technology and our infrastructure, then we won't grow 2.6%; we won't grow 2.2%. We won't grow."

Like so many from the new president, that statement bejewels vacuity with elegant rhetoric. It is, in fact, indefensible.

Energy, education, health, science, technology, and infrastructure are vital national concerns. They always have been and always will be. That each of them has problems also is nothing new. Some of those problems do need prompt attention.

But the economy can grow in spite of them, and to suggest otherwise is exaggeration. The US had the same problems during the 1980s and 1990s yet experienced unprecedented growth. Indeed, the current economic crisis relates more to financial dysfunction and global imbalance than to anything in the formula of problems against which Obama seeks to leverage socioeconomic overhaul.

Other misdirection

This isn't the only misdirection at work in Obama's power move. The president continually holds up the unpopular presidency of George W. Bush as the source of everything needing repair. Yet what he's really attacking is the market-centered, limited-government orientation of Ronald Reagan's presidency of 1981-89. It was Reagan's turn away from high taxation and government activism that made possible an historic cycle of growth. If anything, Bush helped weaken the foundation of Reaganite prosperity with fiscal irresponsibility and market intrusion.

The US government has become a liberal juggernaut threatening harm not only to the oil and gas industry but also to the national economy. The only way to stop it is to discredit a flawed ideological core: the belief that government officials know better than owners do how to run the machinery of wealth creation. Obama has pushed oil and gas into the center of an intellectual fight. The industry must respond. ✦

Survey notes project delays, cancellations

Leena Koottungal
Survey Editor/News Writer

Oil & Gas Journal's semiannual Worldwide Construction Update shows a decline in construction activity compared with the previous edition of the report (OGJ, Nov. 17, 2008, p. 24).

Many companies have delayed their target completion dates for projects reported to OGJ in previous surveys. Some projects listed in the earlier report have been canceled.

Following are project details from the new survey, which is available on line (see box).

Refining

Marathon Oil Corp. plans to delay the expansion of its 100,000 b/d refinery in southwest Detroit (OGJ Online, Mar. 12, 2009). The company originally intended to finish the project in fourth-quarter 2010, but a slowdown in gasoline demand and a delay in the company's Canadian crude production pushed the completion date to mid-2012. Construction, which began in June 2008, will not stop but will continue at a slower pace, says the company. Due to the delay and other factors, Marathon raised its cost estimate for the project to $2.2 billion from the original estimate of $1.9 billion.

Motiva Enterprises LLC has delayed the completion target for a project that will make its 285,000-b/d refinery at Port Arthur, Tex., the largest in the US (OGJ Online, Mar. 18, 2009). Motiva, a joint venture of Shell Oil Co. and Saudi Refining Inc., originally planned to complete the $7 billion expansion in late 2010. The project will be completed in first-quarter 2012.

It will add a single-train crude distillation unit with a capacity of 325,000 b/d and other units. The expanded facility will be the country's largest refinery producer of sulfur and largest producer of petroleum coke. The main project contractor is a joint venture of Bechtel and Jacobs Engineering Group. The largest US refinery now is ExxonMobil's 572,500-b/d facility in Baytown, Tex.

Meanwhile, Kuwait has canceled plans to build a 630,000-b/d refinery at Al Jour on the Persian Gulf coast near the Saudi Arabia border (OGJ Online, Mar. 23, 2009), according to Kuwait Prime Minister Sheikh Nasser Mohammad al-Ahmad al-Sabah. The refinery, which would have been the country's

OGJ subscribers can download free of charge the 2009 Worldwide Construction Update tables at www.ogjonline.com: Click on OGJ Subscriber Surveys, then Worldwide Construction. This link also includes previous editions of the update. To purchase spreadsheets of the survey data, please go to www.ogj.com/resourcecenter/orc_survey.cfm or email orcinfo@pennwell.com.

fourth, was expected to cost $15 billion and scheduled to start in 2013 (OGJ, Nov. 12, 2007, p. 32). Work on the grassroots refinery, which would have produced low-sulfur fuel oil for the country's power plants, was officially halted at the Council of Ministers Mar. 23 meeting after contractors had been notified.

Mozambique's OilMoz plans to build an $8 billion oil refinery in the south of Maputo, designed to reduce the country's dependency on imported fuel, says the company. OilMoz expects to start production by 2014. OilMoz Chief Executive Fausto Cruz said the refinery, with an estimated capacity of 350,000 b/d is expected to benefit both Mozambique and countries in the region which rely on imports of fuel. The company has identified five potential refinery sites.

Cruz said OilMoz will work in partnership with Shell Global Solutions International BV for the study and design of the project. Mozambique's only oil refinery closed 24 years ago.

China National Petroleum Corp. began construction on a 53,000-b/d refinery in Chad. CNPC will hold a 60% stake in the refinery, and Chad's Ministry of Petroleum will hold the remaining 40%. Construction will be completed in 2011.

Vietnam opened its first refinery, a $3 billion project designed to meet a third of Vietnam's fuel demand in 2010. The 148,000-b/d plant in Dung Quat Bay will be operated by state-owned Vietnam Oil & Gas Group (Petrovietnam). This is a continuous catalytic reforming unit under commissioning. Photo from Technip, by Patrick Zachmann/Magnum Photos.

Petrochemical

Kazakhstan's JSC Trade House KazMunaiGaz has selected Axens' ParamaX Technology Suite for the first major aromatics complex to be located at the Atyrau Refinery in Kazakhstan. The new 629,000 tonne/year (tpy) grassroots plant will produce 496,000 tpy of paraxylene and 133,000 tpy of benzene. Plant start-up is scheduled for 2012-13. The front-end engineering designs are led by JSC Omskneftekhimproekt of Russia.

Dow Technology Licensing and Saudi European Petrochemical Co. (Ibn Zahr)—a Saudi Basic Industries Corp. (Sabic) joint venture—started up what they say is the world's largest single polypropylene train at Al Jubail on the Persian Gulf coast (OGJ, Nov. 17, 2008, Newsletter). Nameplate capacity is 500,000 tpy of polypropylene resins. To manufacture homopolymers and random copolymers, the facility uses the Unipol PP process.

In India, ONGC Petro addition Ltd. (OPaL) awarded Samsung Engineering in consortium with Linde an engineering, procurement, construction, and commissioning contract for a dual-feed ethylene cracker unit and associated units worth about $1.43 billion. The plant will be the largest and the first ethylene project in India able to use naphtha and gas as feedstocks, constructed to produce 1.1 million tpy of ethylene and 340,000 tpy of propylene. Scheduled to be completed during the end of 2012, the plant will be in the Special Economic Zone Notified Area in Dahej, Gujarat.

Total Petrochemicals began operations at its upgraded styrene unit in Gonfreville-l'Orcher, near Le Havre, France, making it one of the largest in Europe (OGJ Online, Jan. 22, 2009). The company expanded the unit's capacity at its petrochemicals complex by 210,000 tpy, bringing it to 600,000 tpy.

LNG

At the end of 2008, the first expansion of the Isle of Grain LNG import facility began commercial operations, according to owner and operator National Grid Grain LNG Ltd. The UK project received its first shipment of LNG at the end of November as part of final

CNOOC Fujian LNG Co. Ltd. awarded a contract to CB&I for storage expansion at the 2.6 million-tonne/year LNG terminal in Fujian Province, China. CB&I will design and build two additional 160,000 cu m, full-containment LNG tanks. Photo from CB&I.

cool-down and commissioning. CB&I was the engineering, procurement, and construction (EPC) contractor. The expansion increased Grain LNG's annual capacity to 9.8 million tpy.

The Sakhalin-2 LNG liquefaction plant at Prigorodnoye, Russia, was completed in February (OGJ Online, Feb. 13, 2009). The plant can produce 9.6 million tpy of LNG, with 60% of it bound for Japan. Under contracts of as long as 20 years, Russian LNG will account for 7% of Japan's total LNG imports.

The first LNG cargo arrived at the South Hook LNG receiving terminal in Milford Haven, Wales, according to ExxonMobil Corp. (OGJ Online, Mar. 23, 2009). The terminal will have the capability to deliver as much as 2 bcfd of gas into the gas grid when it reaches full operations later this year. South Hook LNG Terminal Co. Ltd. is owned by Qatar Petroleum 67.5%, ExxonMobil 24.15%, and Total SA 8.35%.

The terminal forms part of the wider Qatargas II joint venture, which uses gas from Qatar's offshore North field. The terminal, which is being completed in two phases, includes five LNG storage tanks, a regasification plant, ship unloading systems, and a jetty to allow berthing of the world's largest LNG vessels.

Gas processing

GS Engineering & Construction Co. completed the construction of a $2.1 billion gas processing plant in Assalouyeh, southern Iran, in mid-March. The facility has a production capacity of 19 million tpy of gas liquids, says the company. GS led a consortium that included two Iranian companies for the project, which began in 2003.

Enterprise Products Partners LP started operations at its Meeker II gas processing plant in Colorado's Piceance basin (OGJ Online, Mar. 12, 2009). The expansion doubles capacity at the Meeker complex to 1.5 bcfd with the capability to extract as much as 70,000 b/d of natural gas liquids.

Enterprise also started operations at its recently expanded Shilling and Thompsonville gas processing plants in South Texas. The Meeker complex is supported by long-term commitments from 10 of the largest producers in the Piceance basin. Current inlet volume at Meeker is 750 MMcfd, with 38,000 b/d of NGL being extracted. Gas volumes are projected to reach 1.1 bcfd by yearend, when NGL production is expected to reach 60,000 b/d.

Meanwhile, Alaska Gas Pipeline LLC let a contract to Fluor WorleyParsons Arctic Solutions for the design of the gas treatment plant for gas delivered from Alaska through its proposed 4 bcfd pipeline to the Lower 48, Alaskan, and Canadian markets (OGJ Online, Feb. 11, 2009).

Fluor WorleyParsons will do the work under a multimillion-dollar preliminary front-end engineering and design (pre-FEED) contract. It will be the world's largest gas treatment plant with process modules weighing up to 9,000 tons. The 5 bcfd plant on the North Slope will remove carbon dioxide, water, hydrogen sulfide, and other impurities from the gas.

Apache Corp., operator of a $585 million natural gas venture in Western Australia, awarded Clough Ltd. a contract for the engineering of the onshore processing plant after resuming work on the project. The contract involves the engineering, design, and procurement of equipment for the Devil Creek gas plant. Clough had been working on the project before it was suspended in December.

The plant, southwest of Dampier, will process gas from offshore Reindeer field developed by Apache and Santos

Ltd. Shipments of gas will start in the second half of 2011. The plant will have the capacity to produce about 202 MMcfd of gas, says Santos. Apache holds 55% interest in Reindeer and Devil Creek, while Santos holds the rest.

Sonatrach let a €1.3 billion contract to Saipem SPA to develop a gas processing facility at the Hassi Messaoud oil and gas complex in central Algeria, about 900 km southeast of Algiers (OGJ Newsletter, Nov. 24, 2008). Sonatrach signed a lump-sum, turnkey contract with Saipem covering engineering, procurement, and construction of three LPG production trains with a total capacity of 8 million cu m/day. The project will be completed by first-half 2012.

Oneok Partners' 119-mile Guardian Pipeline expansion and extension went into service in February, supplying natural gas to two Wisconsin utilities. Photo from Oneok.

Other gas

Doosan Heavy Industries & Construction Co. Ltd. let a contract to Foster Wheeler for FEED and technical services for a coal gasification island in South Korea. The subcontract underpins a coal-based integrated gasification combined cycle (IGCC) plant, which will be operational at the end of 2014. Foster Wheeler will use Royal Dutch Shell PLC's technology for the gasification plant to produce electricity from solid or liquid fuel. Doosan is the EPC contractor for the IGCC plant. The project is partially supported by the Korean government as a part of a national research, development, and demonstration program.

AGL Resources' Golden Triangle Storage has started construction of a 12-bcf working gas capacity salt dome natural gas storage facility at Spindletop in Beaumont, Tex. (OGJ Online, Nov. 18, 2008). The storage site will be able to receive onshore, offshore, and LNG deliveries. Golden Triangle says the first storage cavern will be ready for operation in 2010 or early 2011, with the second cavern following roughly 2 years later. Capacity can be expanded to as much as 28 bcf. The company expects a third 6-bcf cavern to be added shortly after completion of the second. Five brine-disposal caverns are also being drilled on Golden Triangle's site.

Sulfur

In the US Virgin Islands, Black & Veatch is working on sulfur projects for Hovensa. A project in St. Croix involves a 300 tonne/day tail gas treater and a revamp of a 500 tonne/day sulfur recovery unit. Completion is scheduled for 2014.

Black & Veatch is also working on sulfur projects in Argentina, China, India, and Qatar.

Pipeline

In March, China started construction of its third gas pipeline connecting the remote west to the country's eastern cities. The link will have capacity of 20-30 billion cu m/year, said Su Shifeng, chief consultant at China National Petroleum Corp.'s pipeline unit.

Enterprise Products Partners LP and Duncan Energy Partners LP completed construction on the 174-mile Sherman Extension expansion of the Enterprise Texas Intrastate natural gas pipeline system, which extends through the Barnett shale play of North Texas. Throughput on the Sherman Extension is about 360 MMcfd and is expected to reach 950 MMcfd.

The 36-in. diameter pipeline connects a delivery point on the partnerships' Texas Intrastate gas pipeline system near Morgan Mill, Tex., southwest of Fort Worth, with Boardwalk Pipeline Partners LP's Gulf Crossing pipeline near Sherman, Tex. ✦

Iraqi oil minister seeks investment, offers contracts

Eric Watkins
Oil Diplomacy Editor

Iraqi Oil Minister Hussain Al-Shahristani, in a wide-ranging interview with Arab media in Paris, said his country's oil industry needs $50 billion in investment over the next 5-6 years, with much of it expected to come from international oil companies (IOCs).

Iraq wants complete transparency in dealings with IOCs, Al-Shahristani said. And they will all be treated equally, he told the UK-based Al-Sharq al-Awsat newspaper in an exclusive interview.

The minister criticized the Kurdistan Regional Government (KRG) for concluding contracts with IOCs and blamed them for operating in Iraq without the central government's approval (see map, OGJ, Oct. 1, 2007, p. 36).

The minister was in Paris heading a delegation representing 10 ministries "to explore the horizons of mutual cooperation with the French," he said. "And there will be many more meetings with French officials and representatives of French oil companies."

$50 billion needed

Commenting on the impact of fallen oil prices, Al-Shahristani said: "It is clear that the present oil prices are low, unrewarding, and unconvincing, not only from the point of view of oil-producing countries, but also from the point of view of the consumers."

Iraq "depends 90% on its oil revenue," he said, and "the low oil prices affected us badly. In the budget of 2009 we counted on an average price of $50/bbl."

Dismissing the idea that oil prices would remain depressed, however, Al-Shahristani outlined plans to more than double Iraq's current output over the coming decade.

"Our production at present is 2.5 million b/d," he said, adding: "Our 10-year plan (2008-17) is to increase production to 6 million b/d. On a previous occasion we issued permits for six huge oil fields and two gas fields that would lead to an increase in production by 1.5 million b/d."

"Our position is clear—any contract concluded without competition and transparency is unacceptable and contrary to the laws and regulations in force. The concerned companies would not be allowed to operate on Iraqi soil; and if they do, they bear the responsibility for their actions."
—Hussain Al-Shahristani, Iraqi oil minister

He said "a second batch of permits was issued around the end of last year, which we expect to add another 2 million b/d, and thus make a total planned production of 6 million b/d."

Asked where Iraq would get the necessary investment to develop these oil fields, the minister said: "We need an investment of $50 billion over the next 5-6 years. This money is not available locally."

Moreover, he said, Iraq needs finance for the reconstruction process and for services such as housing, education, health, and basic infrastructure facilities. "That is why we are going to the international oil companies—all of which have expressed interest in investing in the Iraqi petroleum industry," he said.

IOC contracts

"In order to facilitate negotiations with these companies we prepared a 'standard contract,' which we proposed to them," Al-Shahristani said. "This contract abolishes the principle of partnership in production and replaces it with a 'production services contract.'"

Under terms of such contracts, he said, "the foreign company would receive a fixed sum of money for every barrel of oil it produces from an oil field allocated to it to develop and produce from, regardless of the ups and downs of oil prices.

"This way, Iraq would be purchasing services from oil companies and paying for them, no more or less. We have so far 35 foreign companies that will be competing for tenders," Al-Shahristani said, adding that IOCs "all expressed their will to compete on the basis of the services contract.

Al-Shahristani acknowledged that the KRG has signed contracts with oil companies but said that "these contracts are not binding on the Iraqi government, and no foreign company has the right to operate in Iraq on the basis of contracts that have not been approved by the government of Iraq."

Citing current Iraqi law, he said, "Only the Iraqi ministry of petroleum has the right to sign contracts on behalf of Iraq. Accordingly, any contracts signed by other parties will not be binding on Iraq. To the foreign companies which signed such contracts, I

say you bear the responsibility of your action."

The minister made clear what IOCs can and cannot do in his country, saying, "A company may drill or develop an oil well or construct pipes and storage facilities, but the oil produced cannot be exported or disposed of. Our view is that it should be surrendered to the Iraqi government to be exported through proper channels."

Contracts with KRG

Regarding current operations in Kurdistan, Al-Shahristani acknowledged that there are "activities and drilling operations taking place, but no oil has been produced from these oil wells." He added, "If any were produced, it might be sold in the internal market or smuggled abroad; but it cannot be exported except through the proper channels owned by the Iraqi government.

"Our position is clear—any contract concluded without competition and transparency is unacceptable and contrary to the laws and regulations in force. The concerned companies would not be allowed to operate on Iraqi soil; and if they do, they bear the responsibility for their actions."

Al-Shahristani dismissed the idea that any one IOC has a special place in negotiations with the Iraqi government.

"Gone are the days when the Iraqi government used to negotiate with a certain company. This used to be the case in the past, in the days of Saddam Hussein, for political reasons," he said.

"Now the companies have to compete through transparent tenders. We open the tenders publicly and the choice is made on a transparent basis. Some companies—and I am not talking about Total—prefer to talk with politicians behind closed doors so as to get some privileges," he said.

"This will not happen in Iraq; companies wishing to compete have to submit their tenders, and they have all welcomed this Iraqi procedure," he said.

Contracts acceptable

The minister claimed that long-standing partners, such as Total SA, are receptive to the idea of service contracts.

"They have no objection," he said, referring to Total. "A month ago we met with them and tens of other oil companies at a conference in Istanbul. Some of them made remarks, some of which were correct.

"Among the correct remarks there were some relating to dual taxation and the need for Iraq to have a law dealing with [that]."

Asked when the first production service contract would be signed, the minister said the first group of licenses may be signed by the midyear and the second batch of licenses by yearend. He said that "35 companies out of 120 applicants are qualified to tender" in the first license round.

The ministry is now receiving applications from companies wishing to be considered for tendering in the second round of licenses and Al-Shahristani said it will "soon announce the names of companies that we regard as qualified to tender." ✦

Iraq considers PSAs in second licensing round

Uchenna Izundu
International Editor

Iraq is considering offering exploration blocks under production-sharing agreements (PSA) this year for its second licensing round, according to Oil Minister Hussain Al-Shahristani. Along with other measures, the PSAs could help the nation boost oil production to 6 million b/d from 2.5 million b/d over the next 6 years, he said.

Speaking at the Organization of Petroleum Exporting Countries' recent international seminar in Vienna, Al-Shahristani said there are 65 blocks that hold oil and gas potential, but Iraq has not yet decided which blocks to offer under production-sharing contracts.

During his address, he said he wants operators to invest $35 billion to improve Iraq's fields under the two current bid rounds. Iraq wants "a fair market share for crude oil and gas on the world market," he added. If its production target is achieved, Iraq would be one of the biggest producers in OPEC after Saudi Arabia.

Iraq's oil industry has been badly affected by war and mismanagement. For the second bid round, operators are being offered acreage under service contracts, which are expected to be signed by the end of the year (OGJ Online, Dec. 31, 2008). Operators are looking at the fields: Majnoon, West Qurnha Phase 2, Halfaya, Gharaf, Badrah, East Baghdad, Central Euphrates oil fields (Kifl, West Kifl, and Marjan), Diyala oil fields (Qumar, Gilabat, Nau Doman, and Khashim Alahmar), Najmah, and Qaiarah. These are expected to add nearly 2 million b/d of production capacity with an estimated investment of £20 billion.

New oil, gas law

Al-Shahristani said it's not known when Iraq's new oil and gas law would be approved by the parliament. The law establishes a sector framework, outlines revenue sharing, restructures Iraq's oil ministry, and creates an Iraqi National Oil Co. The cabinet passed the draft legislation in February 2007, but differences over provisions and among various political parties have blocked its progress in parliament.

"We are proceeding with the bid round; the ministry of oil has full authority to the round, and any contracts that are signed will be presented to the

cabinet for approval," Al-Shahristani said. Gas production is a key tenet of Iraq's petroleum policy. It wants to raise production to 70 billion cu m/year and fully utilize associated gas to end gas flaring by rehabilitating partially damaged gas processing plants in the south and constructing new ones.

Plans to improve the gas pipeline network by connecting gas fields under development also need to be implemented. Iraq aspires to become a gas exporter by 2012. "An estimated quantity of 7 billion cu m/year that is regrettably flared now will be utilized for power generation and other industrial usage," Al-Shahristani said.

The third crucial objective is to raise oil refining capacity to 1.5 million b/d from 600,000 b/d to meet the expected increase in internal and external demand, especially for light products. By next year, two atmospheric distillation towers, with a capacity of 70,000 b/d, in the Durra and Basra refineries are expected to be finished.

Five refineries with a total capacity of 840,000 b/d are to be installed by 2015. These include Nasiriya with a capacity of 300,000 b/d; Kerbala, 140,000 b/d; Missan, 150,000 b/d; Kirkuk, 150,000 b/d; and East Baghdad, 100,000 b/d

IOCs neccessary

Al-Shahristani said relationships with international oil companies (IOCs) would be crucial in realizing Iraq's objectives, but with its revenues being generated from the oil sector, low oil prices are threatening future investment. A 60% fall from peak oil prices last July has severely damaged Iraq's budget.

Contracts for successful operators in the first licensing round are expected to be announced at midyear. This was first publicized last year with six giant producing oil fields requiring rehabilitation: Rumaila (north and south), Zubir, West Qurna Phase 1, Misan oil fields, and Kirkuk and By Hassan oil fields. The fields' production would have to be increased by 1.5 million b/d within 3-4

WATCHING THE WORLD

Eric Watkins, Oil Diplomacy Editor

Blog at www.ogjonline.com

Bring on the clowns

The international oil and gas industry—as well as Russia's—is watching with incredulity as prosecutors bring a new case against former OAO Yukos Chief Executive Mikhail Khodorkovsky.

Can it really be happening again? You bet it can, and with all of the cloak-and-dagger stuff you'd expect from a country run by Vladimir Putin, a former KGB spy, and his entourage—or should one say henchmen? In any case, Khordorkovsky and Platon Lebedev, former head of international financial organization Menatep, suddenly found themselves under way from their Siberian prison and heading back to face the new charges in Moscow.

The charges, which are about as labyrinthine as one can imagine, are not really worth talking about in this space. They are simply the pretext needed to get the two men back into the public limelight for use as a diversion from the country's current financial morass.

Good drama

You have to admit that it makes good drama to have such a wealthy man on trial when so many thousands—or perhaps even millions—of impoverished Russians are emerging from a frosty winter only to face an economy in freefall.

If you think there's any exaggeration in that, just consider the most recent World Bank report that projects Russia's gross domestic product to shrink more than expected this year—with ordinary people feeling the shrinkage more than most.

WB's latest report for Russia forecasts its economy will shrink by 4.5% this year, or about 2.5% worse than Russian officials had expected. And they even see an upturn before yearend. Worse, WB also notes that Russia's dependence on energy has become a liability—along with its reliance on capital inflows and borrowing abroad.

Klaus Rohland, WB representative in Russia, delivered the killer observation, saying, "At this point in the crisis, focus should shift to the people and slightly away from the financial sector because people are now affected by the crisis."

Clowns needed

Focus on the people? You mean actually do something that would help the Russian people survive the crisis? Hmmm...you can bet that probably won't be running through the mind of Putin or his, uhm, entourage.

No, what they clearly have in mind is a circus—especially if there is no bread—and who better to provide the entertainment than prosecutors intimating that Khordorkovsky and Lebedev are responsible for the country's financial woes?

Underlying the new trial, however, is a point of real concern to Putin and his government. Some time ago, members of the Russian parliament were considering a plan that would allow Khordorkovsky his freedom for time already served.

Could anyone imagine the kinds of things the freed oilman—an insider—could say about the Russian government's mishandling of the industry? Such talk would clearly lead back to high places, wouldn't it?

In the absence of bread, bring on the clowns! ✦

years under an estimated investment program of $15 billion. "Thirty five IOCs were prequalified and invited to tender for further development of these fields," Al-Shahristani said.

Overall for these plans, more than $50 billion needs to be invested over the next 5-6 years to reach crude production capacity of 6 million b/d and a refining capacity of 1.5 million b/d.

According to reports, Iraq has invited Chevron Corp., Total SA, and Statoil-Hydro ASA to present proposals to develop Nahr Umr oil field in southern Iraq. But the security situation continues to be a concern along with tough contract terms and the lack of a formal legal framework for the contracts. ✦

Aramco renews commitment to long-term investment plans

Eric Watkins
Oil Diplomacy Editor

Saudi Aramco, in line with newly announced government policies, will continue to invest in new oil, gas, and petrochemical projects, despite the current global economic downturn, according to government leaders and company officials.

"We believe the elements [needed] to succeed in this environment are the ability to integrate petrochemicals with refineries and gas plants, securing feedstocks at competitive pricing, and achieving higher efficiency on product chain integration," said Abdulaziz Al-Judaimi, Aramco's vice-president for new business development.

Al-Judaimi told participants at Chemical Market Associates's 24th World Petrochemical Conference that rising energy and raw material costs have caused rationalizations across the industry, but that Aramco nevertheless remains confident of weathering the economic downturn.

Al-Judaimi's pledge coincided with an earlier statement by Aramco CEO Khalid Al-Falih that the state firm still plans to spend 100 billion Saudi riyals ($26.7 billion) on a petrochemical project in Ras Tanura to be undertaken in partnership with Dow Chemical.

"This investment will amount to approximately 100 billion riyals when completed and will include the construction of integrated industrial cities where the private sector can invest in conversion and support industries," Al-Falih told delegates at a chamber of commerce meeting in the country.

"Despite the difficult global economic situation currently, and the challenges facing the energy sector, the kingdom will continue with its long-term investments," Al-Falih said, echoing a decision by senior government leaders.

On Mar. 25, Saudi Arabia's council of ministers announced that the country would continue its long-term investment projects in the oil and gas sectors to increase production to ensure an adequate energy supply in world markets.

"The Kingdom will go ahead with this policy despite the current economic situation and the challenges being faced by the energy sector," the Cabinet said following its weekly meeting chaired by King Abdullah.

The Cabinet said the Kingdom would also focus on research and development, acquiring modern technology to develop a variety of environment-friendly energy products.

The Cabinet came to its decision after reviewing the outcome of the recent meeting of the Organization of the Petroleum Exporting Countries when Saudi Arabia's petroleum and mineral resources minister Ali Al-Naimi warned of a possible "catastrophic" energy supply crunch without prompt investment.

"In years to come, if traditional energy supplies should prove inadequate because capital expenditure was curtailed due to unsustainable prices, unreliable indication of future demand, or hopes for a substitute that oil cannot deliver, such a supply crunch would be catastrophic," Al-Naimi told OPEC delegates. ✦

Brazil considering OPEC's renewed membership invitation

Eric Watkins
Oil Diplomacy Editor

Brazil's President Luiz Lula da Silva, apparently reversing earlier decisions, said his government is again considering an invitation to join the Organization of Petroleum Exporting Countries.

"Very, very soon Brazil is going to participate in OPEC," said the Brazilian president, according to Argentina's Empresas News. If correct, the statement would reverse earlier remarks by Lula, who last year said he preferred Brazil to export refined products, not crude.

The Brazilian president's remarks follow a Mar. 23 statement by Mines and Energy Minister Edison Lobao, who said the country was officially invited to join OPEC, but that it should enter the organization only when it effectively becomes an oil exporter.

At the moment, he said, OPEC membership would not be possible as Brazil, which consumes all of its own production and still imports oil, would not be able to implement OPEC output cuts. But Brazil could join once it has taken care of domestic needs and begun to export oil, he said.

The statements by Lula and Lobao indicate a possible shift in policy, as last September Brazil declined an invitation from Saudi Arabia to join OPEC, citing plans to export refined oil, not crude from its deep water reserves. At the time, Lobao said Brazil determined it didn't need OPEC, because the Latin American country planned to boost oil income by refining crude into products like gasoline for export abroad.

Petroleo Brasilerio SA's Refining and Petrochemicals Chief Executive Paulo Roberto da Costa confirmed Lobao's remarks, saying, "Brazil was invited to participate in OPEC and did not accept because our priority is refining here and exporting derivatives."

Earlier that year, Lula also opposed OPEC membership in favor of becoming an exporter of refined products.

"Brazil is going to be transformed into a major producer. I do not want it to become an exporter of petroleum," he said. "I want Brazil to export petroleum products" (OGJ, July 7, 2008, p. 37). ✦

Obama signs far-reaching public lands bill

Nick Snow
Washington Editor

Calling it an "extraordinary piece of legislation," US President Barack H. Obama signed a far-reaching public lands bill into law on Mar. 30.

The measure, HR 146, won bipartisan support because it combined 160 smaller bills involving historic sites with provisions that add 2 million acres to the federal wilderness system. The bill also expands other designations that effectively remove more federal acreage not just from oil and gas leasing but also from potential use as alternative energy generation sites.

"This legislation guarantees that we will not take our forests, rivers, oceans, national parks, monuments, and wilderness areas for granted, but rather we will set them aside and guard their sanctity for everyone to share. That's something all Americans can support," Obama said.

US Interior Secretary Ken Salazar called the bill "a Herculean first step in President Obama's agenda for our open lands."

In addition to the 2 million acres of new federal wilderness, he said it would put into law the 26 million-acre National Landscape Conservation System within the US Bureau of Land Management, preserve 1,000 new miles of wild and scenic rivers, and "better protect some of America's most special places, from Oregon's Mount Hood to the dinosaur tracks of New Mexico to Virginia's wild forests."

US Senate Energy and Natural Resources Committee Chairman Jeff Bingaman (D-NM), who helped guide the legislative package through the Senate twice, called it "a great day for America's natural resources. With just the stroke of a pen, the president made a promise to future generations come true by helping preserve the natural wonders of this nation."

Lisa Murkowski (R-Alas.), the committee's ranking minority member, said the legislation was "a good example of how we in Congress can find success through hard work and bipartisanship." The package of bills "is hugely beneficial to individual communities, especially in western states where the federal government owns so much of the land," she maintained.

The bill's provisions include an amendment to the Alaska Natural Gas Pipeline Act authorizing the federal coordinator to establish fees which could be spent without further congressional appropriation for activities authorized under current law, she noted.

House Speaker Nancy Pelosi (D-Calif.) said the bill includes water-related provisions that would help manage drought, particularly in the US West; improve aging infrastructure; recharge groundwater supplies; and promote the reuse and recycling of water.

"Today is a great day for all who care about our beautiful country and its pristine natural heritage," she said. ✦

Waxman's clean energy draft includes cap-and-trade proposals

Nick Snow
Washington Editor

US House Energy and Commerce Committee Chairman Henry A. Waxman released a draft of clean energy legislation on Mar. 31 that he said was aimed at reducing US dependence on foreign oil and combating global warming.

Waxman and Edward J. Markey (D-Mass.), who chairs the committee's Energy and Environment Subcommittee, said the proposed legislation, the 2009 American Clean Energy and Security Act (ACES), is a comprehensive approach to US energy policy that charts a new course toward a clean energy economy.

"This legislation will create millions of clean energy jobs, put America on the path to energy independence, and cut global warming pollution. Our goal is to strengthen our economy by making America the world leader in new clean energy and energy efficiency technologies," Waxman said.

The draft, which he and Markey said

would create millions of new clean energy jobs, enhance US energy security and cut global warming pollution, has four titles. The clean energy title aims to promote renewable sources, carbon capture and sequestration (CC&S) technologies, low-carbon fuels, clean electric vehicles, and the smart grid and electricity transmission.

The energy efficiency title aims to increase energy efficiency across the US economy, including buildings, appliances, transportation, and industry. The global warming title would place limits on emissions of heat-trapping pollutants, and the transitioning title would protect US consumers and industries and promote green jobs during the transition to a clean energy economy, Waxman and Markey said.

Cap-and-trade

The global warming title discusses a possible cap-and-trade program. "One key issue that the discussion draft does not address is how to allocate the tradable emission allowances that restrict the amount of global warming pollution emitted by electric utilities, oil companies, and other sources. This issue will be addressed through discussions among committee members," the discussion draft summary noted.

Other Democrats on the committee applauded the proposals. Rick Boucher (Va.) said it includes bipartisan legislation he introduced on Mar. 24 to fund accelerated development of CC&S technologies. "I am reviewing the provisions of the draft and will be consulting with interested parties, including colleagues on the committee, regarding changes which I will recommend for the purpose of assuring the control program is economically sustainable and will not be economically disruptive," Boucher said.

But the committee's ranking minority member, Joe Barton (R-Tex.), was not impressed. "Tuesday's cap-and-trade bill marks a triumph of fear over good sense and science, and it couldn't come at a worse time because it proposes to save the planet by sacrificing the economy," he maintained.

Barton said US unemployment stands at 8.1%, with a rise to 8.5% expected, and jobless rates already top 10% in California, Nevada, North Carolina, South Carolina, Oregon, Michigan, Rhode Island, and Washington, DC. "So it's not surprising when the Gallup Poll reports that 41% of Americans consider global warming an exaggeration. I consider it a dangerous exaggeration because it gives rise to plans like this one, which increase unemployment and raise electricity bills," Barton said.

Waxman said the committee would complete consideration of the legislation by Memorial Day. He said the Energy and Environment Subcommittee would hold hearings the week of Apr. 20 and begin marking up the bill the week of Apr. 27. The full committee is scheduled to begin its markup the week of May 11, the chairman said. ✦

CFTC increases its exempt commercial market oversight

Nick Snow
Washington Editor

The US Commodity Futures Trading Commission closed the so-called "Enron Loophole" on Mar. 23 as it approved final rules and amendments increasing its oversight of exempt commercial markets (ECMs).

The rules implement provisions of the 2008 CFTC Reauthorization Act, which created a new regulatory category, ECMs with significant price discovery contacts, and subjected these electronic trading facilities to additional regulatory and reporting requirements effective Apr. 22, the commission said.

Federal lawmakers and groups that had been critical of CFTC not taking action sooner welcomed the move but added that more financial market oversight is needed.

"What should be of great concern to all is how long it took the CFTC and Congress to act," said Industrial Energy Consumers of America Pres. Paul N. Cicio on Mar. 24. "We still have many more pressing government oversight gaps to close," he said.

Cicio noted: "We are reminded of the excessive speculation that occurred during the first half of 2008 when natural gas prices doubled while domestic production increased by 8.6% and national inventories were well within the normal 5-year average. The increase in the price of gas cost homeowners, farmers, and manufacturers about $40.4 billion. Excessive speculation caused the run-up, not supply versus demand fundamentals."

Additional steps

Cicio said Congress and CFTC should also establish position limits for speculators, require "aggregating position limits" across all exchanges and the over-the-counter market, and establish limits or ban index funds and passive long-only and short-only funds.

The US Senate Energy and Natural Resources Committee's Energy subcommittee will hold a hearing on Mar. 25 to examine draft legislation aimed at improving energy market transparency and regulation. Two of its members, Byron L. Dorgan (D-ND) and Maria Cantwell (D-Wash.), asked US Attorney General Eric H. Holder Jr. on Mar. 18 to establish an Economic Crisis Financial Crimes Task Force to investigate and prosecute criminal behavior involved in events that caused the current economic downturn.

ECMs were created under the 2000 Commodity Futures Modernization Act as electronic markets to trade exempt commodities on a principal-to-princi-

pal basis between qualified commercial entities supposedly at the urging of Enron Corp., which was an active energy trader at the time. By 2007, these unregulated markets had grown to a point that critics said showed speculators used them to circumvent regulated exchanges and manipulate crude oil and other commodity prices.

Impact on prices

When CFTC began to investigate, it eventually concluded that information was insufficient about how price swaps and other financial instruments were being used to affect commodity markets. It found, however, that these financial instruments sometimes had an impact on prices, and that they needed to be regulated. Congress gave CFTC authority to regulate them as part of the 2008 reauthorization act.

Acting CFTC Chairman Michael V. Dunn said on Mar. 23 that the new rules are a step in the right direction to make ECMs more transparent and accountable so participants and the general public can be better protected.

"The final rules put in place the framework in which we will exercise our new authority to police these important contracts," Dunn indicated. He said the new rules incorporate several changes:

- They revise information submission requirements for ECMs.
- They establish procedures and standards by which CFTC determines that an ECM contract performs a significant price discovery function.
- They provide guidance with respect to complying with nine statutory core principals for ECMs with significant price discovery contracts.
- They amend existing regulations applicable to registered entities in order to clarify that such regulations now apply to ECMs with significant price discovery contracts.

CFTC said several commenters, in responses to the commission's notice of proposed rulemaking, expressed concern about proposed acceptable practices for position limits or account-

Hard work for Western Caucus

US Rep. Rob Bishop (R-Utah) was ready to give Ken Salazar the benefit of the doubt. Then, during the US Interior secretary's first few weeks in office, he canceled several leases from a December onshore sale in Utah, delayed preparation of a new 5-year Outer Continental Shelf leasing plan, and withdrew an oil shale proposal solicitation.

The lease cancellations particularly disturbed Bishop, who is a senior member of the House Natural Resources Committee, because they deprived Utah of $300 million in federal royalties. "He didn't just take away leases. He affected people's lives; he took away jobs," Bishop told me on Mar. 20.

Bishop said Salazar's actions were part of a troubling trend. "There was a lack of engagement early on, and many people thought that the Obama administration would take a moderate approach. With the stimulus package, the proposed budget, and Secretary Salazar's actions, it's obvious they plan to take the government further left," he said.

Bishop, who chairs the House's Western Caucus, said he and other members are trying to develop alternatives to the administration's proposals. He found the new oil and gas taxes and fees "deeply troubling" and suggested that using royalties from increased production on federal lands for an alternative technologies development trust fund would be "an orderly, logical process."

Democrats, too

But he also said that any proposed compromises will need to be bipartisan and to have Democrats' support. Western Caucus Republicans are working with oil-state Democrats such as Gene Green of Texas and Dan Boren of Oklahoma to educate federal lawmakers and their staffs about modern oil and gas production, he explained.

"It will take a lot of outreach and education, more than simply standing up and screaming, to get more people to understand what's going on," Bishop said.

The problem isn't limited to members elected to their first terms in 2006 and 2008, he continued. "A lot of old members from urban districts don't have a clue about what's going on. We want to take people from the urban East and show them the relatively minor impact an oil and gas field has in comparison to a solar or wind farm," he said.

Still talking

Bishop said he's encouraged that the bipartisan spirit that brought many House Democrats and Republicans together last summer to work on Reps. John E. Peterson (R-Pa.) and Neil Abercrombie's (D-Ha.) OCS proposal has extended into 2009. "People on the floor are still talking about doing something in a bipartisan way. The Obama administration is the new player, and it isn't interested yet," he told me.

"The energy issue hasn't gone away. We still have abundant resources that are locked away. A unique situation forced prices down toward the end of last year, but that won't last. We in the Western Caucus want to be ready with viable alternatives when they are needed," Bishop said. ✦

ability relating to uncleared trades. The comments raised complex issues, which warrant further consideration, CFTC said, and it chose not to make this core principle final until these issues could be examined fully. The commission said it expects to complete a review and issue a separate rulemaking in the next several months. ✦

NPRA: Speakers differ on ethanol 'blend wall' issues

Bob Tippee
Editor

Meeting specifications for renewable fuels in the US requires rapid growth in the use of 85-15 ethanol-gasoline blends (E85) and, if the ethanol industry has its way, relaxation of the current 10% cap on gasoline for uses other than in flexible-fuel vehicles (FFVs).

Both options raise problems, including the possibility that raising the blending cap threatens equipment and safety, speakers said at the National Petrochemical & Refiners Association's annual meeting in San Antonio.

Sagging gasoline consumption and annual increases in the mandate for renewable fuels combine to make imminent a phenomenon known as the "blend wall."

That's when the market for gasoline other than E85 has absorbed all the ethanol it can at the 10 vol % blending level.

The blend wall

The blend wall might arrive as early as 2011-12, according to Geoff Cooper of the Renewable Fuels Association, an ethanol advocacy group.

Compliance with renewable fuel standards after that will require rapid expansion of E85 or, failing that, approval of "midlevel" ethanol blends.

At present, FFVs, which safely can use E85, represent 3% of the US light-duty vehicle fleet. And E85 is available in only 1.5% of US retail outlets.

Problems with expanding the E85 market, Cooper said, include ethanol's mileage penalty relative to gasoline, infrastructure costs, unsettled specifications and standards, and a mismatch between where most FFVs are sold (California and Florida) and where E85 is most available (the Midwest farm belt).

After pointing out that the country now has about 2,000 E85 outlets and 7 million FFVs, Cooper cited US Department of Energy estimates that the US needs 60,000 E85 retail outlets and 90-110 million FFVs to achieve renewable fuel objectives.

Noting that US automakers have committed to raising their production of FFVs to half their new vehicle fleets within a few years, he said relaxation of the 10% cap still may be needed.

Without congressional action, that might happen in one of two ways: a finding by the Environmental Protection Agency that 11-12% ethanol blends resulted in no substantial degradation in fuel environmental performance or a Clean Air Act fuel waiver, also from EPA, raising the cap.

A group of ethanol producers called Growth Energy on Mar. 5 applied for a waiver for ethanol blends as high as 15%.

Cooper said test data exist showing that elevated ethanol can be used in concentrations above 10% without causing damage.

Different views

But speakers from the automobile and small-engine industries expressed sharply different views.

Coleman Jones, biofuels implementation manager at General Motors, said that long-term effects were not assessed when tests on ethanol blends above 10% showed no harm.

Tests conducted in Australia and by the US Department of Energy on elevated ethanol blends "are not encouraging," he said.

Midlevel blends of ethanol will not solve the near-term blend wall problem but might be important in the longer term, Jones argued. They won't bring enough ethanol into the market to meet the mandates when the material is needed, and they create "real dangers to existing hardware."

He said a group involving eight automakers and six oil companies proposes tests that will account for "durability" and not be "just a snap shot" of ethanol's effects and said the government should not mandate midlevel blends until results are available.

After listing engine parameters possibly at risk from increased ethanol blends, including items such as emissions performance and engine durability, he said, "Some people might suggest that the waiver is a bit premature."

Kris Kiser, executive vice-president of the Outdoor Power Equipment Institute, said 200-300 million pieces of equipment with small engines are in use in the US.

"Anything that's above 10% [ethanol] is a real challenge for the equipment," he said.

DOE tests of midlevel blends show elevation of exhaust gas temperature, risks to operators from unintentional clutch engagement, damage to engines, and operational problems.

He said the consumer product companies his group represents worry about safety, economic losses, warranty protection issues, and lawsuit exposure from a higher ethanol blend cap.

"Once an engine is damaged by ethanol, it's damaged," Kiser said.

Referring to "legacy products" not made to accommodate ethanol in concentrations exceeding 10%, he said, "Real lawyers are going to be on us once these things start dying." ✦

NPRA: Economy shaping climate politics

Bob Tippee
Editor

Economic pain will shape how the US addresses climate change—if not the question whether it responds at all.

Advocates of both approaches spoke at the opening session of the National Petrochemical & Refiners Association annual meeting in San Antonio.

John Hofmeister, founder and chief executive of Citizens for Affordable Energy and former president of Shell Oil Co., supported a cap-and-trade system for regulating emissions of greenhouse gases but called schemes under discussion in the US "unworkable."

Christopher Horner, senior fellow of the Competitive Enterprise Institute, appeared with Hofmeister in a panel session and urged oil companies to resist the cap-and-trade approach as well as a carbon tax.

Earlier, NPRA Pres. Charles Drevna decried US political pressure for a "wholesale transition" in energy use in service to what he called the unfeasible goal of energy independence.

Climate politics

Hofmeister said lowering greenhouse gas emissions with a regulatory cap with provision for trading of emission allowances should be part of a broader global assault on gaseous wastes of all kinds.

But a cap-and-trade system should start with emission credits and introduce a cap only after methods for lowering emissions have matured, he said.

A system that starts with an auction of credits, such as those with most support in Congress and the administration, will collapse. "The economy can't afford it," Hofmeister said.

Asserting that he doesn't subscribe to any particular global warming theory, the former Shell Oil chief said action of some sort is inevitable. In Europe and on university campuses in the US, he said, "It is a given that carbon is dangerous.... There's such a consensus out there that we're going to have to deal with it in some way."

Hofmeister said he fears an economically damaging response to climate change would derail global efforts to manage all gaseous waste as many countries have successfully controlled solid and liquid wastes.

And he criticized the polarized politics of climate change, which he called "the most dysfunctional discussion I've experienced in my career."

Horner urged industry to resist cap-and-trade as well as carbon taxation as responses to climate change.

He noted satellite temperature data that indicate global cooling over the past decade and data histories showing that indicated increases in temperatures that preceded increases in concentrations of carbon dioxide in the atmosphere.

Observations like those discredit the computer models that underlie political calls for urgent cuts in CO_2 emissions—costly actions that Horner said can't affect temperature.

He said the politics of climate change fits a political pattern in which "we have demonized everything, including the things that bring us wealth, health, and survival."

And he opposed the view that action on climate change is inevitable.

"As the cooling continues, it's going to be harder to pass the largest tax in American history," Horner said, referring to the climate program in the federal budget proposed by President Barack Obama.

Political climate

In observations about the US political climate in general, Drevna said Congress and the Obama administration should "look beyond short-term political comfort to long-term economic health."

He said the priority should be energy security rather than energy independence and argued that security comes from a variety of energy sources, including oil and gas.

"The demise of the hydrocarbon molecule has been greatly exaggerated," Drevna said.

Asked at a press conference about NPRA's opposition to a cap higher than the current 10% on ethanol blended in most gasoline, Drevna said that if the ethanol industry, which wants the change, assumes liability for effects on vehicle engines, "then we'll back off."

He called the legislative mandate for renewable vehicle fuels of 36 billion gal/year by 2022 "unfeasible," whether or not gasoline consumption resumes growth.

With a growing mandate already straining the fuel market's ability to absorb ethanol while requiring new amounts of ethanol from sources other than grain, refiners face the need to "chase credits for something that doesn't exist," Drevna said. "They might as well write checks to the Treasury."

But he said lawmakers, including some from farm states, are beginning to question the ethanol mandate.

"Just because the ethanol industry wants something doesn't mean they can get it all the time," he said. ✦

US to see more LNG, despite downturn

Warren R. True
Chief Technology Editor-LNG/Gas Processing

More shipments of LNG will come to the US this year, whether the market needs them or not.

As much as 90 million tonnes/year of new LNG supply will flow towards global markets this year and next. With current LNG markets in a balance never before seen in world trade, the additional volumes must move somewhere. That somewhere is the market of last resort: the US. That market is already adequately supplied, thanks to the recent surge in shale gas production.

These were some of the major trends announced last month at Platts' 8th Annual LNG conference in Houston.

US surge

For some time now, industry analysts have predicted that excess cargoes of LNG will find a home in the US, a default location in an increasingly balanced global trade. As prices fall in Asia and Europe, the argument goes, the plethora of storage and the thoroughly liquid market in North America will attract shipments unable to fix destinations in the other two markets.

Waterborne Energy's Steve Johnson told the conference an average about 3 bcfd would arrive this year. Last year saw a sharp decline from the record volumes that arrived in 2007. While predicting growth in LNG shipments in the US for this year and next, Johnson did not explain why this would happen, given that natural gas demand, especially industrial and commercial, has dropped off the table. US markets are adequately supplied by domestic production and Canadian imports, complemented by what little LNG is coming here to satisfy existing long-term contracts.

Industry truths, supply delays

David Wells, vice-president for global LNG supply at Shell Gas & Power International BV, said there are three "truths" in the current market.

The first is that long-term demand is rising; the second, that security of supply is threatened by the passing of the "easy plays," resource nationalism, and the rise of unconventional resource developments such as shales in North America and coalbed methane in Australia; and the third, that global environmental concerns have put hydrocarbon developments under pressure.

By 2050, said Wells, energy use must be "twice as efficient" as in 2008. To get there, carbon dioxide regulation "must be efficient and global."

Wood Mackenzie's Gavin Law, head of the firm's gas and power consulting, noted the imminent arrival of new LNG supplies on the global market but cautioned that delays to those projects may still retard the wave. He also said the global economic crisis was just now hitting major supplier countries.

In general, Law sees a slow ramp up to full production for new LNG supply and said that LNG demand is being curtailed, especially in the US, by development of unconventional natural gas sources. ✦

COMPANY NEWS

Suncor, Petro-Canada merge in $19.3 billion (Can.) deal

Suncor Energy Inc. and Petro-Canada, both of Calgary, have agreed to merge the two companies in a $19.3 billion (Can.) transaction. The resulting company, Suncor, will have 7.5 billion boe of proved and probable reserves with existing production of 680,000 boe/d.

In other recent company news:

- Korea National Oil Corp. and Colombia's state-run Ecopetrol acquired Offshore International Group, Houston, whose main asset is Petro-Tech Peruana SA, for $900 million. KNOC and Ecopetrol split the purchase price equally.
- The third stage of the coalseam methane (CSM) alliance between Shell Exploration Co. BV and Arrow Energy Ltd., Brisbane, has been completed.

Suncor, Petro-Canada merger

Suncor will become the largest holder of oil sands properties for both mined and in-situ resource recovery. It also will hold assets in every major oil development project on Canada's East Coast. International holdings involve oil and natural gas production from the North Sea, North Africa, and Latin America.

The combined company will have refining capacity of 433,000 b/d, Suncor said.

Completion of the proposed merger depends upon approval by Suncor and Petro-Canada shareholders, as well as regulatory approvals from the Canada government. Suncor and Petro-Canada anticipate closing the transaction during the third quarter.

Suncor Pres. Rick George will continue as president for the combined company. Upon completion of the proposed transaction, Suncor's existing shareholders will own 60% and Petro-Canada shareholders will own 40% of the merged company.

Terms call for Petro-Canada common stockholders to receive 1.28 common

PERSONNEL MOVES AND PROMOTIONS

Chevron makes executive changes

Chevron Corp. has promoted **John S. Watson** to vice-chairman. Currently serving as executive vice-president, strategy and development, Watson succeeds **Peter J. Robertson**, who is retiring from the company after more than 35 years.

The company also named current vice-president and general counsel **Charles A. James** as executive vice-president. These executive changes became effective Apr. 1.

Watson joined the company in 1980 as a financial analyst. He assumed his current position in 2008. As vice-chairman, Watson will add corporate compliance and policy, government, and public affairs to his broad portfolio of responsibilities.

Robertson joined Chevron in 1973. He was named president of Chevron USA Production Co. in 1997. In 2000, Robertson became president of Chevron Overseas Petroleum Inc. He has served as vice-chairman since 2002.

James will oversee the company's legal, corporate governance, human resources, and security organizations. James joined Chevron in 2002 after serving as assistant attorney general in charge of the antitrust division at the US Department of Justice.

Other moves

Devon Energy Corp. has appointed **David A. Hager** executive vice-president, exploration and production.

Hager currently serves as a member of Devon's board and will resign immediately. Hager joined Devon's board in 2007 and has served as chairman of the reserves committee.

He has served as chief operating officer of Kerr-McGee Corp. prior to its merger with Anadarko Petroleum Corp. in 2006. Hagar has more than 25 years of oil and gas exploration and production experience, including an extensive background in planning and executing deepwater exploration and development projects.

Total Petrochemicals USA Inc. has appointed **Geoffroy Petit** chief executive officer and vice-president of base chemicals.

Petit also will serve as the country representative for all 16 Total affiliates operating in the US.

Petit joined the company in 1984. He previously was responsible for global strategy and services for Total Petrochemicals in Brussels.

Toreador Resources Corp. has named **Craig McKenzie** president and chief executive officer. McKenzie has served as the interim president and chief executive officer of Toreador since Jan. 23.

He has more than 23 years of experience in the oil and gas industry. Before joining Toreador, McKenzie was chief executive officer and director of Canadian Superior Energy Inc. He also served as president of the BG Trinidad & Tobago unit of BG Group PLC.

shares of the merged company for each common share of Petro-Canada they own. Each Suncor common stockholder will receive one common share of the merged company for each common share of Suncor they own.

Ron Brenneman, Petro-Canada president and chief executive officer, will assume the role of executive vice-chairman in the merged company.

The two companies estimate the resulting company can cut existing operating expenditures by $300 million/year through efficiencies in overlapping operations, streamlining business practices, and improved logistics.

The companies also expect to achieve capital efficiencies of $1 billion/year through elimination of redundant spending and targeting capital budgets to high-return, near-term projects.

The merged company's board is expected to comprise 12 directors, including eight members from Suncor's current board and four members from Petro-Canada's current board. John Ferguson, Suncor Energy chairman, will serve as chairman of the merged company.

The boards of both companies approved the proposed merger.

KNOC, Ecopetrol deal

KNOC and Ecopetrol set a goal to more than double production within 3 years. Current production is 12,000 b/d.

Petro-Tech Peruana began operating in January 1994 on Block Z2B along Peru's northern coast. Its proved and probable reserves are estimated at more than 100 million bbl. The company holds one producing and 10 exploration blocks in Peru.

Shell, Arrow alliance

Arrow and Shell pledged to develop Arrow's estimated 70 tcf of gross CSM resources on its permits in Queensland through an LNG project at Gladstone on the central east Queensland coast.

Shell will provide world-class expertise in LNG technology, plant design, construction, and marketing. Arrow received the last of the up-front payments of $155 million, which brings the company's total amount received to date to $454 million.

Arrow seeks to accelerate its LNG exports, which would create hundreds of jobs and position the company as a dominant player in the global CSM market. ✦

Nonproducing Paraguay's potential conventional and unconventional

James Wade
Quincy Oil & Gas Corp.
Asuncion

A number of external factors have come together to provide many opportunities for growth for the fledgling hydrocarbon industry in Paraguay. These include higher gas prices regionally coupled with increasing demand, particularly in Argentina, Brazil, and Chile, all of which plan to import liquefied natural gas at world prices and at great capital cost.

Paraguay consumes the equivalent of 30,000 b/d of oil as refined products such as gasoil, gasoline, lubricants, and aviation fuel, all of which are imported.

It is hoped that with proposed drilling by CDS Oil & Gas Group PLC in 2009 there will be success in finding oil in commercial quantities that can be produced for refining at the government owned 7,500 b/d Petropar refinery at Villa Elisa near Asuncion. This would reduce refined product imports and conserve hard currency.

If exploratory drilling for natural gas by any of the active exploration companies proved up commercial volumes, it might be possible to develop the gas fields, provide gas for domestic use, and build the pipelines needed to export gas to nearby markets.

Lack of production

Many have wondered why Paraguay has no oil or gas production.

They reason that the country should be productive because hydrocarbons have been produced for more than 75 years in Bolivia just to the west and for more than 25 years at Palmar Largo in Argentina a few kilometers south of Paraguay.

A combination of technical and financial factors in Paraguay influenced the oil companies that conducted the exploration in years past not to continue their efforts. Some of them were:

1. They did not satisfy the parameters of the geologic model of the large producing wells that they were pursuing.
2. They lacked the computer technology to interpret their exploration results, as can be done today.
3. They had other interests to pursue

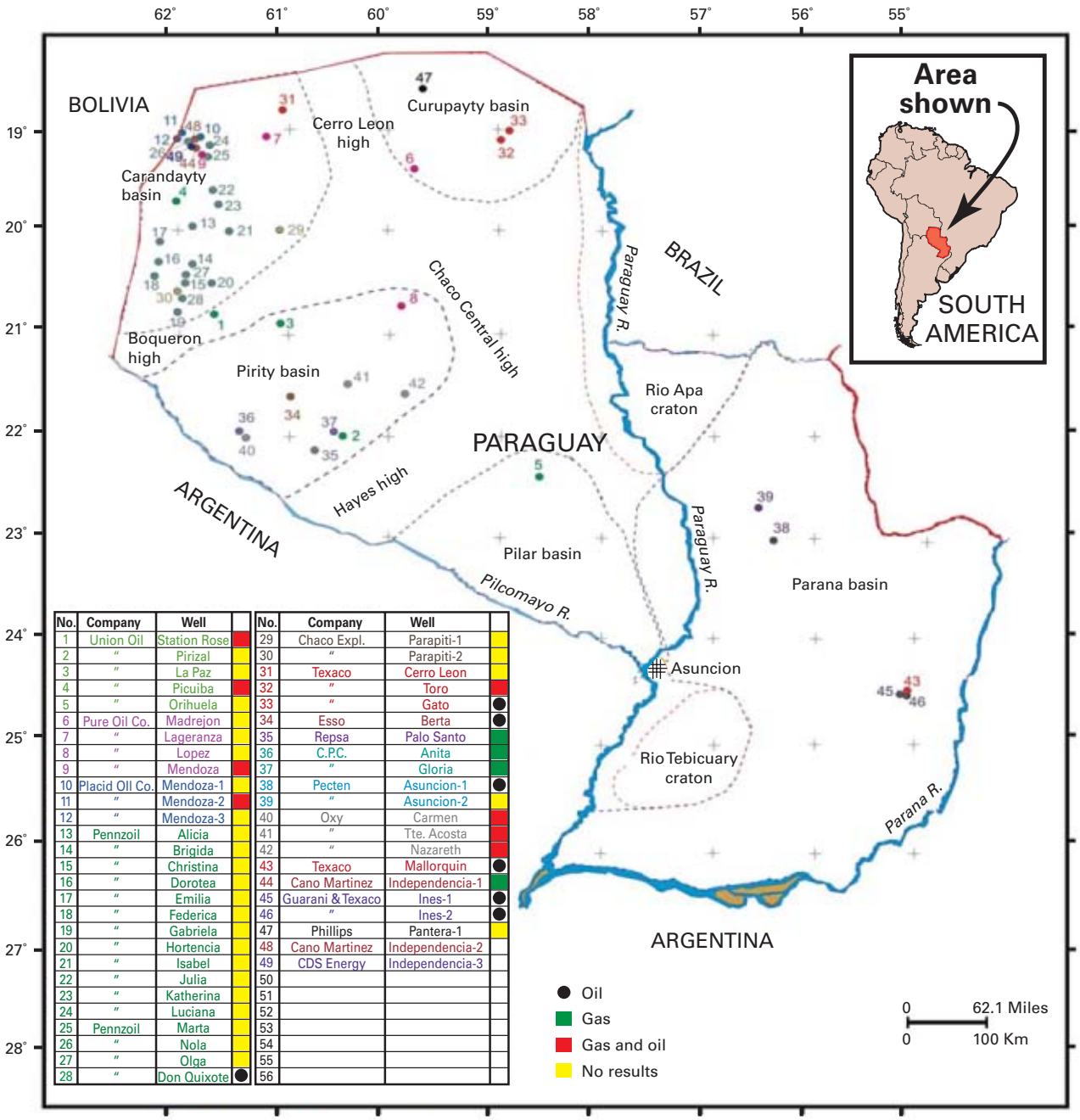
PARAGUAY NEAR-TERM WORK PROGRAMS

Table 1

Company	Properties/projects	Comments
Quincy Oil & Gas Corp.	2 prospecting blocks covering an aggregate of 1,107,000 ha. Independent prospective resource estimate of 112 bcf of conventional gas and 1.2 tcf unconventional gas.	Aeromag, geochem, and stratigraphic drilling planned for 2009.
CDS Oil & Gas Group PLC	2 concession laws and 1 prospecting permit covering an aggregate of 1,547,990 ha. Published prospective recoverable resource of 6.4 million bbl and 142 bcf.	Announced plans to drill in 2009.
Aurora Petroleos SA and Boreal Petroleos SA, both co-owned by Artemis Petroleum PLC and Pantera Petroleum Inc	Concession laws on 5 separate blocks totaling 1.6 million ha. Published prospective resource of 129 million bbl	2009 program not confirmed.
Crescent Global Oil SA and Pirity Hydrocarburos SRL owned by Crescent Global Oil LLC and Petro Victory LLC	2 exploration and production permits and 1 prospecting permit for an aggregate of 2.33 million ha.	Plan an aggregate of 2,800 km of 2D and 3D seismic in 2009 and drilling in 2010.
Amerisur Resources PLC	2 exploration and production permits covering 1.6 million ha. Estimated unrisked prospective resource of 708 million boe on the San Pedro Block and 248 million boe on the Curupayty Block.	Planning geochemical survey and seeking farmout participants.

OIL AND GAS EXPLORATION IN PARAGUAY

Fig. 1



No.	Company	Well	
1	Union Oil	Station Rose	
2	"	Pirizal	
3	"	La Paz	
4	"	Picuiba	
5	"	Orihuela	
6	Pure Oil Co.	Madrejon	
7	"	Lageranza	
8	"	Lopez	
9	"	Mendoza	
10	Placid Oil Co.	Mendoza-1	
11	"	Mendoza-2	
12	"	Mendoza-3	
13	Pennzoil	Alicia	
14	"	Brigida	
15	"	Christina	
16	"	Dorotea	
17	"	Emilia	
18	"	Federica	
19	"	Gabriela	
20	"	Hortencia	
21	"	Isabel	
22	"	Julia	
23	"	Katherina	
24	"	Luciana	
25	Pennzoil	Marta	
26	"	Nola	
27	"	Olga	
28	"	Don Quixote	●

No.	Company	Well	
29	Chaco Expl.	Parapiti-1	
30	"	Parapiti-2	
31	Texaco	Cerro Leon	
32	"	Toro	
33	"	Gato	●
34	Esso	Berta	●
35	Repsa	Palo Santo	
36	C.P.C.	Anita	
37	"	Gloria	
38	Pecten	Asuncion-1	●
39	"	Asuncion-2	
40	Oxy	Carmen	
41	"	Tte. Acosta	
42	"	Nazareth	
43	Texaco	Mallorquin	●
44	Cano Martinez	Independencia-1	
45	Guarani & Texaco	Ines-1	●
46	"	Ines-2	●
47	Phillips	Pantera-1	
48	Cano Martinez	Independencia-2	
49	CDS Energy	Independencia-3	
50			
51			
52			
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54			
55			
56			

in the Gulf of Mexico, Alaska North Slope, and the North Sea.

4. During 1971-73, when Pennzoil drilled 16 wells, the price of oil was $2-3/bbl, rendering questionable economics, and no local market existed for gas, which traded at 15-25¢/Mcf.

5. Infrastructure was limited in the Chaco basin.

6. Paraguayan politics were not encouraging for investment by foreign corporations.

Exploration history

The first exploration well drilled for oil in Paraguay was in 1947 and the latest in 2005.

In the intervening 58 years only 48 wells were drilled by several international oil companies and two private Paraguayan companies (Fig. 1). During 1947-2008 the various companies acquired 21,434 line-km of 2D seismic data.

The Chaco basin is a large sedimentary basin located mainly in northwestern Paraguay and southeastern Bolivia.

The portion in Paraguay is minimally explored.

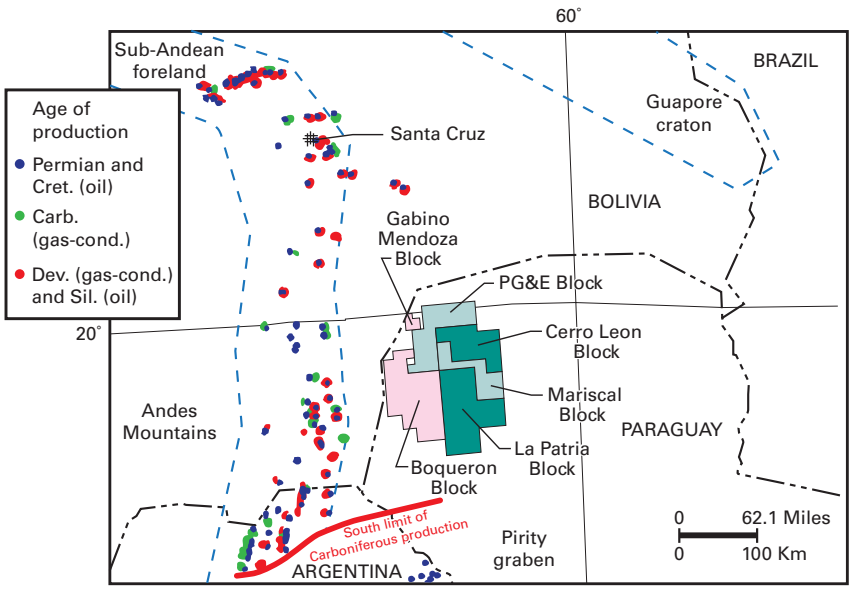
Reprocessed seismic data since 2001, recent concepts in seismic stratigraphy and analysis, and interpretation of multiple data bases from several previous operators allowed for positive revisions to the geological model and hydrocarbon assessment of the Paraguayan Chaco basin. The revisions confirmed that five important aspects that are indicators of the potential presence of commercial hydrocarbons are present. These are adequate hydrocarbon sources, reservoirs, seals, trapping mechanisms, and migration timing.

Geology and potential

Production in adjacent areas of Argentina and Bolivia include the Chaco basin foreland in Bolivia and the Salta rift (also known as the Pirity graben, or Pirity subgraben in Paraguay).

These areas produce from the same geologic formations as found in northwestern Paraguay. Fig. 2 is a summary diagram of northwestern Paraguay to illustrate these producing areas adjacent to Paraguay.

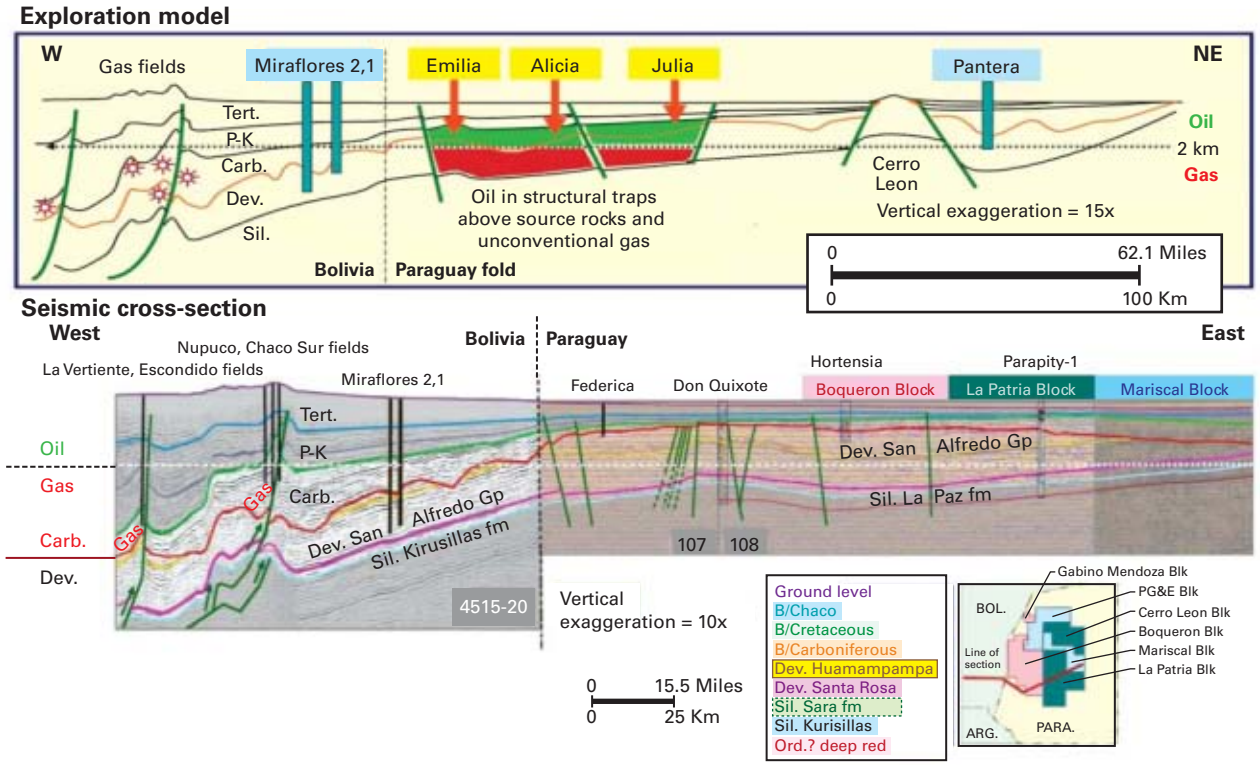
BOLIVIAN HYDROCARBONS ADJACENT TO NW PARAGUAY BLOCKS Fig. 2



Source: Updated with permission from LeRoy and Carlson, 2002, used by permission of Paraguay Vice-Ministry of Mines & Energy. Modified from Lindquist, 1998.

WHERE EXPLORERS ARE SEEKING OIL IN PARAGUAY

Fig. 3



Source: After Carlson and Ruble, 2006, modified with permission

The incremental addition in Bolivia of more than 50 tcf of gas in 1999-2003 was partly the result of government incentives and privatization that are no longer in effect. The large gas reserve additions were mostly in the Carboniferous Escarpment, Tarija, and Tupambi intervals, and also the Devonian Huamampampa formation.

New technology also resulted in first production for Silurian and Cretaceous oil pools, mostly northeast of Santa Cruz, Bolivia. The source beds for these new reserves are the Silurian Kirusillas formation, the Devonian Los Monos and Icla formations, and a very minor Cretaceous oil source bed, the same source beds as are present in the Chaco basin of northwestern Paraguay.

Along the southwest boundary of northwestern Paraguay, Cretaceous oil production of 50 million bbl from 10 fields is sourced by an organic-rich shale, formed in Cretaceous lakes, in the Salta rift. Half the reserves are in one field, which supplied a portion of the crude oil for the refinery in Asuncion for many years.

A seismic line and an exploration model indicate the potential for shallow Carboniferous oil and deeper Devonian unconventional gas in northwestern Paraguay (Fig. 3).

Explorers are looking for Carboniferous oil in structural traps above the hydrocarbon source beds in Devonian and Silurian shales, which also contain unconventional gas accumulations. The diagram demonstrates extensional faulting in Paraguay, updip of the world-scale producing gas province in the Tarija basin foothills in southern Bolivia.

The concession blocks in Paraguay target reservoirs that are the same age as and at much shallower depths than those in Bolivia. As a result, Carboniferous rocks in Paraguay are oil-bearing. Devonian and Silurian rocks are mostly gas-bearing.

Above 2,000 m, oil is being generated in the Devonian today, as proved by geochemical data in wells. Below that depth, chemical reactions in the gas-

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generating window have changed previously generated oil to natural gas and continue to make natural gas from the available organic material in the rocks.

Outlook

The area-wide recovery potential for the Paraguayan Chaco basin, located east of the current production in Bolivia, was estimated in 2002 for the government of Paraguay by Earth View Associates, Houston, at more than 4 billion bbl of oil equivalent.

The US Geological Survey also released its own assessment in 1998.

Several factors render the Paraguayan Chaco basin attractive for hydrocarbon exploration and development. These include larger and growing markets for hydrocarbon products both domestic and for export to the neighboring countries of Argentina, Brazil, and Chile, significantly increased oil and gas prices since the early 1970s, improved infrastructure, and a positive political climate. Another big factor is decades of exploration success and production on the Bolivian side of the basin, which is regionally downdip of the Paraguayan Chaco basin.

Paraguay also has a favorable hydrocarbon law, 779/95, wherein concessions are granted and guaranteed by Congress. The production royalties and tax laws for investors offer benefits conducive to the high risk nature of oil and gas exploration and development.

New production techniques in the US Permian basin, the Montney producing area in Alberta and British Columbia, and especially the San Juan basin of northwestern New Mexico, prove that formations with unconventional reservoir properties can be commercial.

The biggest change is the large-scale production of unconventional gas in the US. By some government estimates, 40% of the production in the US is now from unconventional fields. In the past decade, new production techniques have extended commerciality to even more gas accumulations. The largest hydrocarbon resources in northwestern Paraguay are in unconventional Devonian and Silurian intervals. ✦

Chile

GeoPark Holdings Ltd., Hamilton, Bermuda, gauged a gas-condensate development well on its 100%-held Fell Block in Chile, where it has identified more drilling locations in the updip area of Monte Aymond field.

The company's 2009 plans also call for the first drilling on the Tranquilo and Otway blocks in the Magallanes

basin (see map, OGJ, Dec. 24, 2007, p. 36).

The Monte Aymond-33 well tested at 3.12 MMcfd of gas, 22.6 b/d of condensate, and 33.9 b/d of water with 654 psi wellhead pressure on a 12-mm choke from the Cretaceous Springhill formation. TD is 2,391 m. The well is to go on line in April.

Colombia

Petro Vista Energy Corp., San Clemente, Calif., acquired 100% interest in the VMM-13 block in Colombia's Middle Magdalena basin.

Seismic and geological studies are to start in the first quarter of 2010 on the 118,816-acre block.

Meanwhile, Petro Vista signed two farmouts on its Morichito block in the Llanos basin. While remaining operator with 35% interest, the company will be reimbursed for past expenses and carried on three wells.

Drilling is to start in several weeks and will target the Carbonera C7 and Mirador formations at 3D seismic locations updip from the previously drilled Morichito-2 well, being abandoned as noncommercial. All permits are in hand, and road and pad construction is under way.

India

Hardy Oil & Gas PLC proposed to revise the appraisal program for its Ganesha nonassociated gas discovery in the CY-OS/2 block off Pondicherry in the northern Cauvery basin off southeastern India.

Hardy, operator with 75% interest, would reduce the program to one firm and one contingent well from three firm and two contingent wells. Gas Authority of India Ltd. has 25%.

The companies are working with the Ministry of Petroleum & Natural Gas to extend the exploration license to 2012 to establish commerciality.

Ireland

Serica Energy PLC expects to secure a rig shortly to drill the Bandon exploration prospect in PEL 01/06 in the Slyne basin off Ireland's west coast.

Drilling on the large gas prospect is to start in May 2009.

Serica is operator with 50% interest, and its costs will be largely carried by RWE-Dea, which is taking a farmout to earn the other 50%.

Bandon is a gas prospect in Triassic Sherwood sandstone 45 km southwest of undeveloped Corrib gas field. Corrib, discovered in 1996, is 85 km off northwest Ireland with 800 bcf of recoverable gas in Sherwood at 3,000 m subsea.

Italy

AleAnna Resources LLC of Texas was awarded the Ponte del Diavolo exploration permit in northern Italy's Po basin just west of its Corte dei Signori permit, where it just finished shooting 80 sq miles of 3D seismic.

Seismic identified several structures worth drilling, said Saxon Oil Co. Ltd., Dallas, which owns 20% membership interest in AleAnna. Drilling could start in late 2009.

AleAnna has applied for nine other exploration permits in Italy that are in various stages of government consideration.

Nigeria

Consulting engineers estimated at least 52 million bbl and perhaps as much as 106 million bbl of oil is recoverable from Ebok field on OML 67 off southeastern Nigeria.

Operator Afren PLC said Ebok-4, fourth well in the field discovered in 1968, drillstem tested at 1,450 b/d of 20-25° gravity oil and cut 284 ft of high-quality reservoir sands at 2,560-3,718 ft.

Afren and Nigerian partner Oriental Energy Resources Ltd. are studying an early production system that could deliver 15,000-25,000 b/d in early 2010 from five or more horizontal wells and one water injection well (OGJ Online, Feb. 5, 2009). A second phase with eight more wells might boost output to 35,000-50,000 b/d.

UK

Venture North Sea Gas Ltd. said logs at the 43/21b-5z Carna well in the UK North Sea indicate a gas column of more than 1,490 ft true vertical depth and 127 vertical ft of net pay.

The well, sidetracked to test a Carboniferous fault block, stabilized at 9 MMcfd of gas on a $^{48}/_{64}$-in. choke from the target formation. No formation water was produced. Total depth is 11,500 ft measured depth.

The well is suspended pending further sidetrack to become a future production well. A field development decision is to be made after full evaluation of the data.

Carna prospect interests are Venture 56%, Ithaca Energy Inc., Calgary, 29.9%, and Dyas UK Ltd. 10.1%. Interests in the greater Carna area are Venture 40%, Ithaca 44.85%, and Dyas 15.15%.

Alberta

Stealth Ventures Ltd., Calgary, moved its Cretaceous Colorado shale biogenic gas project at Wildmere, eastern Alberta, to a development play from an exploration play in 2008.

The company reduced capital spending 20% to $300,000/well to drill, complete, and tie in. The shales lie at 500 m or less in the area 120 miles east-southeast of Edmonton (OGJ, Mar. 17, 2008, p. 40).

Net December 2008 gas sales were about 3.1 MMcfd. Stealth drilled 81 wells in 2008.

The company has more than 400 development locations ready to drill and will resume drilling in the second half of 2009 to avoid spring breakup and limited access due to agricultural activity.

HYDRAULIC FRACTURING—Conclusion

Additional keys give stimulation insights

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Four keys provide a way for understanding, modeling, and predicting shear stimulation and its benefits in naturally fractured reservoirs.

The first part of this two-part series (OGJ, Mar. 23, 2009, p. 37) discussed the complex geometries formed and the first key, while the concluding part will cover the remaining three keys.

Second key

The second key relates to understanding the flow dominated by natural or induced fractures. Warpinski did the pioneering work on this topic and Reference 1 contains summary statements in regard to the pressure distribution away from a central fracture plane, as follows:

- "For gas reservoirs, the leak off into the matrix is very small and seldom exceeds a few tens of feet. In these reservoirs, leak off into the natural fractures is the important issue, as it can result in fracturing fluid moving an order of magnitude greater distance from the fracture."
- "For a porous medium, the porosity and permeability are that of the matrix. For natural fractures, the permeability and porosity are those of the natural fractures and the matrix effect is ignored."

This distinction between fracture-dominated flow and matrix-dominated flow is critical. For example, the pressure transient that spreads through the reservoir during a fracture treatment is the usual cause of any shear failure.[1,2] For fracture-dominated flow, the pressure transient can spread much faster and farther than via a matrix without fractures.

The natural fractures are preferred conduits for pressure transient during a fracture treatment (Fig. 1). Even though fracture porosity is normally <0.5%, permeability can be high: 0.1-1,000 md.[3] The higher value of fracture permeability and lower value of fracture porosity imply that even tight gas reservoirs can have very high diffusivity, and this determines the rate of pore pressure diffusion through the reservoir.

If the treatment creates a hydraulic fracture with cross-linked gel, the cloud of microseismic bursts is much smaller than when the job uses slick water. The difference is that with cross-linked gel formation of an impermeable filter cake follows the spurt loss at natural fractures. The filter cake prevents pressure transmission along the natural fractures, thereby inhibiting shear failure.

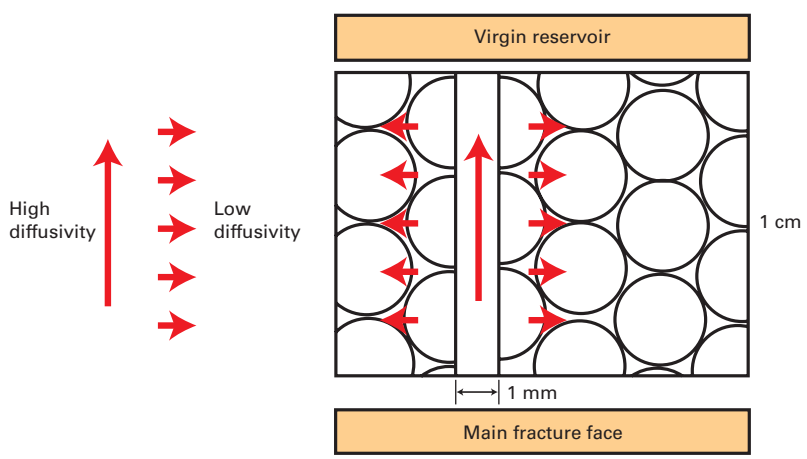
With slick water, however, very little or no filter cake forms. Water or gas inside natural fractures transmits pressure and may cause shear failure.

Note that during injection, the fracture permeability is not only virgin fracture permeability but also could include ballooning of fractures plus any permeability enhancement due to shear or tensile failure. This is the lumped model that we use.

Our concept is that there is a strike-slip synergism between pore-pressure diffusion and shear failure. That is, at the start, the pressure transient spreads along a natural fracture and at some point becomes high enough to induce shear failure. When that happens, the permeability over some fracture length increases through dilatancy (Fig. 2),[4]

PRESSURE TRANSIENT

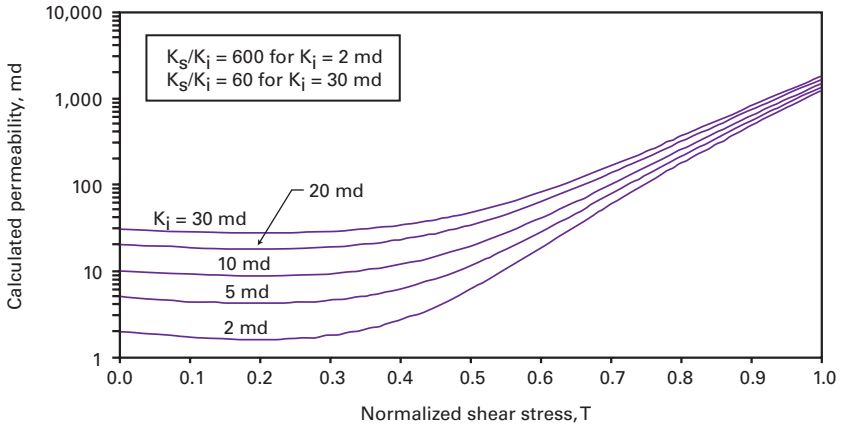
Fig. 1



Note: Natural fractures are the preferred conduits for pressure transient during hydraulic fracturing.

COAL SHEAR-BOX TESTS

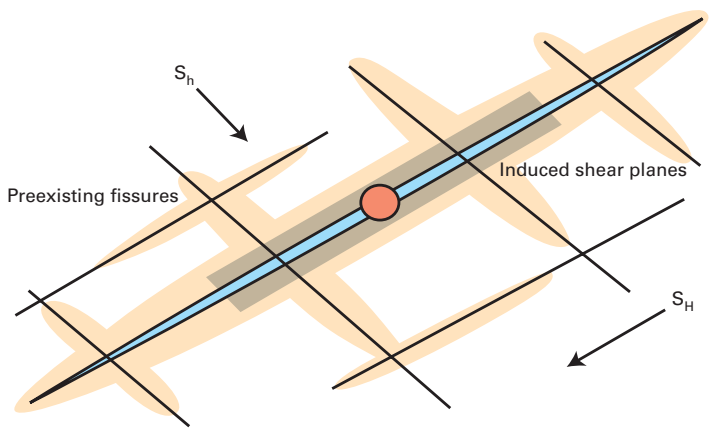
Fig. 2



Note: Permeability increases from shearbox tests on coal, as a function of initial permeability.
Source: Reference 4

PRESSURE-DEPENDENT LEAK OFF

Fig. 3



Note: Central fracture plane, and offset fractures that contribute to pressure-dependent leak off. The offset fractures can be preexisting fissures or shear-induced fractures.
Source: Reference 7

and this allows the pressure to spread faster and further.

This can explain how shear failure and microseismic bursts occur at unexpectedly large distances.

An alternative explanation, offered by Barree,[5] is that formation compression resulting from an inflated central fracture induces shear failure. Bedding planes that separate lithologies with different mechanical properties will exacerbate the shear failure.

Natural fractures also are preferred conduits for leak off during a fracture treatment. This implies that fracture porosity determines initial depth of leak-off invasion, not matrix porosity.

Third key

Barree and coworkers over many years have explored in depth the next key to shear stimulation, which is understanding pressure-dependent leak off in natural and induced fractures.[6 7]

The idea is that offset fractures can open under pressure during a hydraulic fracture treatment and contribute to the leak off (Fig. 3). But more than this, as pressure increases, the widths of the offset fractures increase and the leak off increases exponentially (Fig. 4). This can have dire consequences, including frac treatment screen out.

The signature of pressure-dependent leak off (PDL) lies in a plot of GdP/dG vs. G, where G is a function of dimensionless time as defined by Nolte,[8] and can be differentiated from other effects such as fracture extension after shut-in, fracture compliance, and fracture height recession.[6 7]

The PDL factor, C_{dp}, in the exponential leak-off formulation of Fig. 4 must closely relate to pressure-dependent permeability (PDP) in natural fractures, which one also usually models with an exponential function of pressure change.

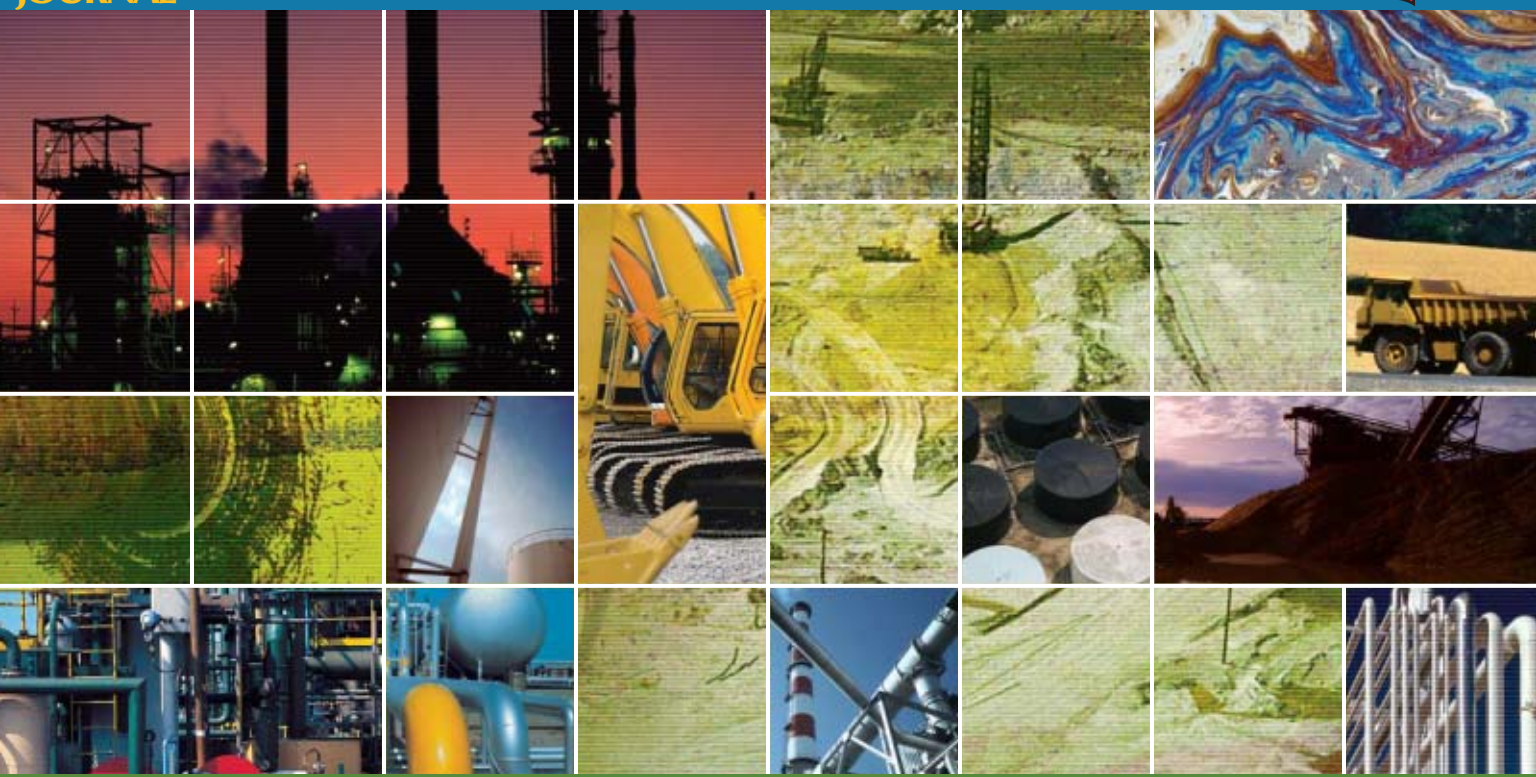
If we assume they are of the same order, this conceptually allows us to input PDL to models for matching microseismic burst patterns, which require an enhanced permeability during injection. This connection, which other modelers seem to have overlooked, is why we regard PDL as a key to shear stimulation.

To take this a step further, Fig. 5 illustrates the large increases in leak off with pressure that correspond to actual ranges of C_{dp} inferred from field measurements of PDL in tight sands.[9] Now if we assume that permeability increases are of the same order, it is clear that permeability can increase enormously with injection pressure, for example by 10-1,000 times.

This ties in well with enhanced permeability measured in lab tests, as illustrated in coals (Fig. 2).

A direct consequence of this is that we can track increases in fracture permeability (natural or induced) if we know bottomhole pressure during a fracture treatment. To illustrate, in one case the offset fracture permeability increased by about 100 times, based on measured PDL, just before a screen out (Fig. 6).[10] We have inferred even larger permeability increases in other cases.

The critical insight is that one should input PDL to any modeling prediction of shear stimulation. One can use a measurement of PDL during prefracture tests, such as diagnostic fracture injection tests (DFITs) or minifracs to obtain a C_{dp} factor for input into the model.



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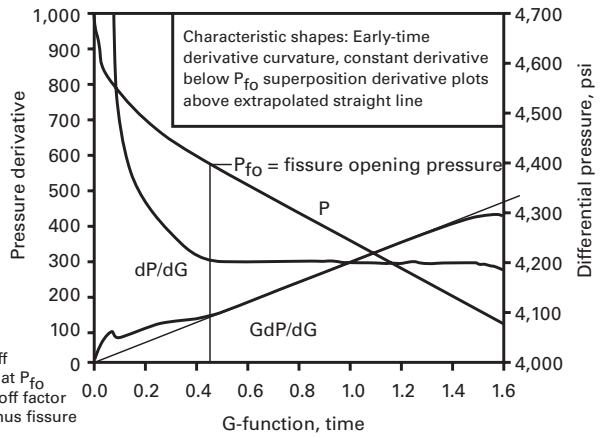
PRESSURE-DEPENDENT LEAK OFF IN NATURAL FRACTURES

Fig. 4



$C_p = C_o \exp(C_{dp}\Delta P)$
where:
C_p is pressure-dependent leak off
C_o is original leak-off coefficient at P_{fo}
C_{dp} is pressure-dependent leak-off factor
ΔP is local fluid pressure (P_f) minus fissure opening (P_{fo}) = $P_f - P_{fo}$

Source: References 6 and 7

We have done this in one case in which we matched microseismic burst patterns, as follows:

One modeling approach assumes a pressure-dependent permeability function (for natural or induced fractures) and uses this as a variable parameter to match both microseismic burst pattern and well production.[11 12] Fig. 7 shows one such function, where the pressure-dependent permeability increase during injection reaches about 60 times.

Another such function gives a permeability increase of 667 times for a pressure increase of only 81 psi.[11] Note, this increase would include permeability enhancement due to shearing plus other mechanisms such as ballooning of fractures or tensile failure. This lumped approach is also the approach we have used in our modeling discussed in the following section.

In summary, the role of fracture-dominated pressure-dependent leak off in shear stimulation is as follows:

- It has the same order-of-magnitude as pressure-dependent permeability (actual pressure-dependent permeability can be up to 10 times larger).
- Permeability increases due to PDL can be very large during fracture treatments (exceeding 100 times) because the mechanism is fracture-dominated (natural or shear-induced fractures).
- It allows the pressure increase to travel through the formation faster and further. This is needed to match microseismic data.[11 12]
- On balance, there is a big difference between injection permeability and production permeability (Fig. 7). Pressure-dependent permeability is generally smaller during production and depletion in hard rock because of cement in natural fractures.[13]
- A lumped pressure-dependent permeability during injection would include permeability enhancement due to shearing as well as ballooning of fractures and tensile failure.

Fourth key

The fourth key involves matching microseismic patterns because shear failure directly causes microseismic bursts. Again, it was Warpinski who recognized this as a key and documented a detailed effort to model and match observed microseismic burst patterns.[1 14] There are two extremes of modeling to match microseismic observations:

1. Sophisticated finite element or discrete element.[11 15-17]
2. Analytic screening model.[1 2 14]

Fig. 8 summarizes our in-house screening model, FracFail, which is similar to earlier approaches.[1] As pore pressure diffuses away from the central fracture plane throughout the reservoir, it induces shear failure out to some distance, which one can predict from in situ stresses and rock strengths.

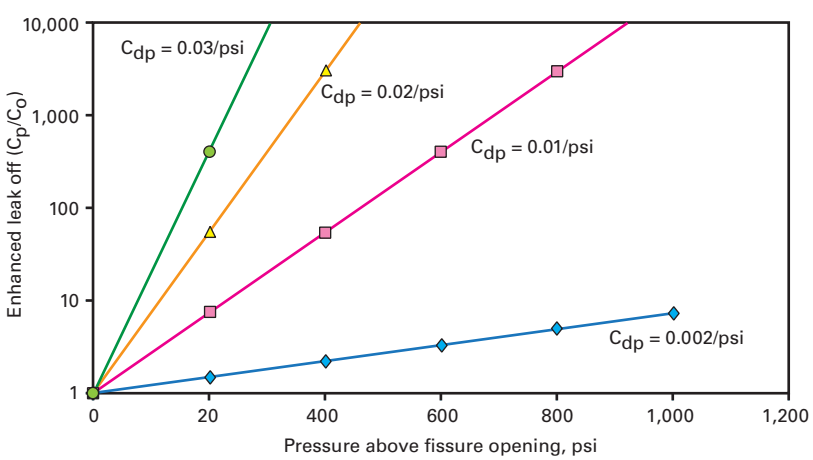
The spread of the pore pressure depends on the fracture-dominated permeability and porosity, as explained earlier. In an ideal case, we would extract the fracture permeability from

LEAK-OFF RANGE

Fig. 5

- Tight sands/shales: C_{dp} = 0.002-0.03/psi (from Reference 9)
- Coals: C_{dp} = 0.002-0.11/psi (from Reference 9)

If $K_s/K_o \sim C_p/C_o$ → permeability can increase enormously with injection pressure



Note: Range of leak off increases with pressure that arises from actual field measurement of pressure-dependent leak off (via C_{dp}) in tight sands and coals.

pressure-dependent leak-off measurements, and this leaves the fracture porosity as a free parameter.

Although this is only a screening model, it captures the keys to shear stimulation, and the modeling results appear to reflect the important physics. More sophisticated models require more input parameters and usually take a long time to run (many hours). Our model, after initial set up, runs in less than 1 min.

It can match quickly a pattern of microseismic data and do sensitivity studies that reveal what inputs are most important and, therefore, need careful measurement. We envision that the model will be used for designing a shear stimulation in a real well because it can run different scenarios quickly.

To illustrate some differences between the screening and sophisticated models, the more sophisticated model of Reference 16 includes both shear and tensile failure, injection above or below parting pressure, and prediction of permeability enhancement from first principles. Nevertheless, permeability increases with normalized injection pressure are of the same order as found with our screening model.[2]

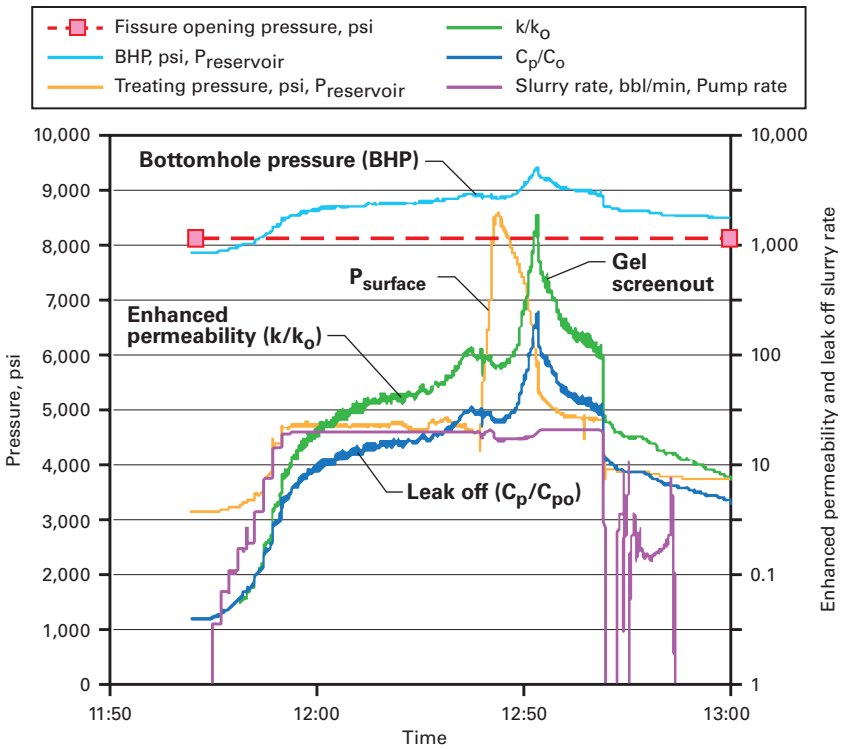
Finally, we matched two microseismic burst patterns in separate fields,[10] and the results are captured in Fig. 9. The permeability enhancements obtained from the matching vary from 30 times to 135 times. They appear consistent with higher pressure-dependent leak-off values from the general range in tight gas plays[9] of C_{dp} = 0.002-0.03/psi that appear as straight lines. Note: We assume in Fig. 9 that pressure-dependent leak off is of the same order as pressure-dependent permeability.

The microseismic matching results also are consistent with the general characterization of natural fractures (Fig. 10)[3] because the matching porosities we obtained are very low (<1%). Although this does not prove the matching results are correct quantitatively (more work will need to verify this), it does indicate some self-consistency in our model and results.

Note, in one modeling case in Fig. 9, we actually input permeability enhancement obtained from a pressure-dependent leak-off measurement in the same well, and this is recommended in future matching of microseismic burst patterns.

Main fracture treatment

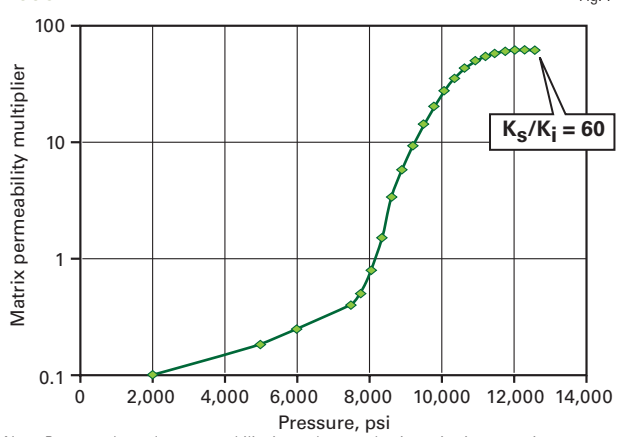
Fig. 6



Source: Reference 10

Pressure-dependent permeability

Fig. 7



Note: Pressure-dependent permeability is used to match microseismic pattern in Reference 10. Injection is where K_s/K_i >1 and production is where K_s/K_i <1.
Source: References 10 and 12

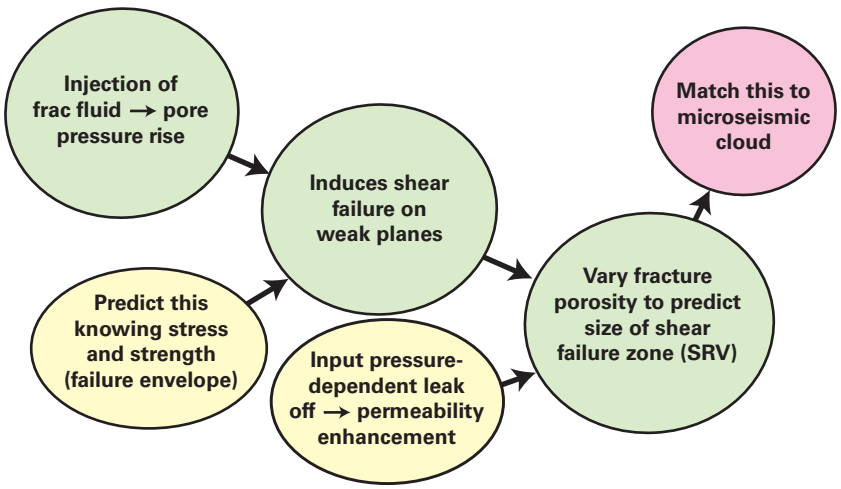
Permeability retention

All the previous discussion has focused on shear failure and enhanced permeability during fluid injection, such as a fracture treatment. The permeability increases can be very large, especially in hard rock. When pore pressure, however, dissipates after completion of the injection, the enhanced permeability may dissipate also, as discussed in other references.[18]

How much enhanced permeability remains is difficult to predict, and some information suggests that the

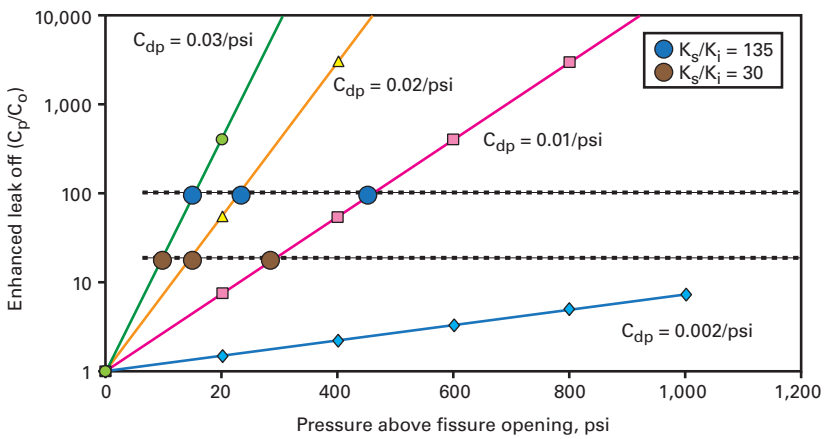
MATCHING MICROSEISMIC BURST PATTERN

Fig. 8



PERMEABILITY ENHANCEMENTS

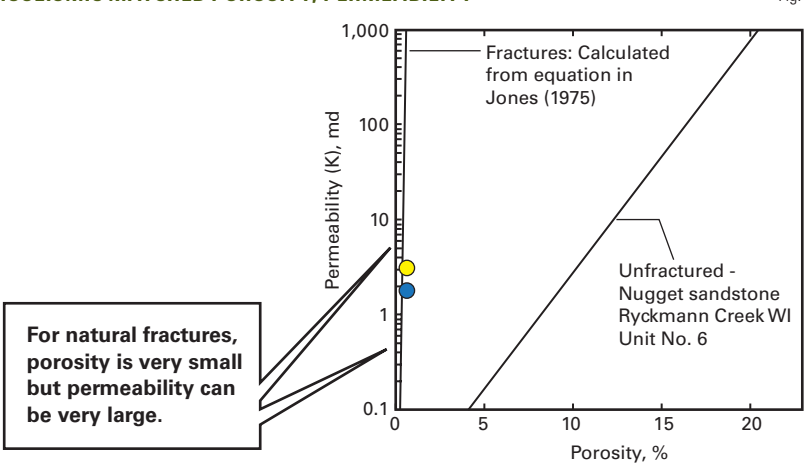
Fig. 9



Note: Permeability enhancements are after matching of microseismic patterns in two separate cases, using FracFail, superimposed on pressure-dependent leak-off trends.

MICROSEISMIC MATCHED POROSITY, PERMEABILITY

Fig. 10



Note: Figure shows relative positions of matrix and fracture curves.

formation may lose a large proportion of the shear-enhanced permeability. Fig, 7 implies that none of the enhanced permeability remains when a well goes on production.

The hope, however, is that one can mitigate the permeability loss by creative design of proppant injection to prop open the natural or induced fractures before they close.

Acknowledgments

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GUIDE TO WORLD CRUDES

StatoilHydro publishes Gimboa crude oil assay

StatoilHydro has published a crude oil assay for its Gimboa field, which began producing first-quarter 2009 from Block 4/05 about 3 miles off Angola (Fig. 1) in 2,300 ft of water.

Production is from two different reservoirs with expected gravity at 23° API, according to the published report.

Sonogol operates the field on behalf of StatoilHydro ACR (Angola Consulting Resources) and SOMOIL (Sociedade Petrolefira Angolana). Estimated recoverable reserves are about 50 million boe.[1]

The Gimboa project consists of three production and four water-injection subsea wells around a central manifold. That manifold is tied back to a floating production, storage, and offloading (FPSO) unit.

Working under a $570 million contract, Saipem last year delivered the FPSO Gimboa, a converted oil tanker with 1.8 million bbl of oil storage. It has production capacity of 60,000 b/d of oil and 60,000 b/d of water. Maximum natural gas production is 36.8 MMcfd.

Fig. 2 shows a true boiling point (TBP) curve for the whole crude.

The following data are from StatoilHydro.

Whole crude

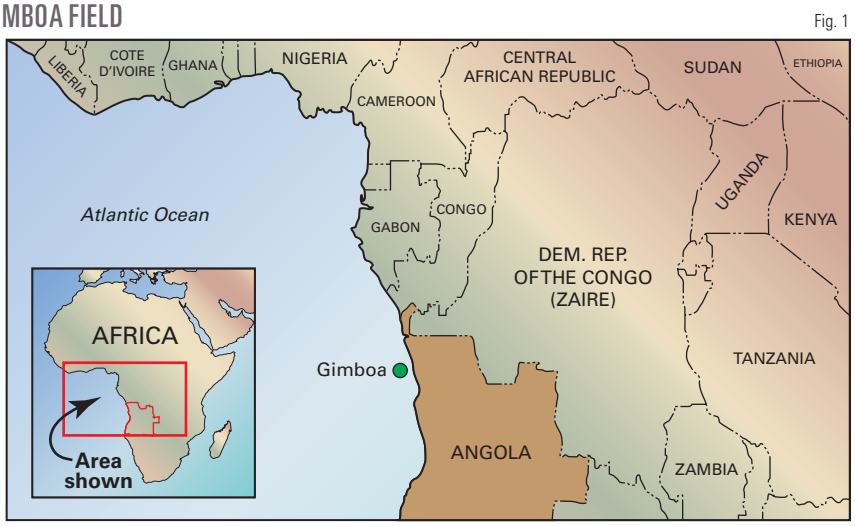
Density at 15° C., kg/l.: 0.9114
Specific gravity: 0.9119
API gravity, °API: 23.67
Sulfur, mass %: 0.646
Total acid number, mg KOH/g: 0.78
Pour point, °C.: –33
Kinematic viscosity at 20° C., cst/sec: 92.25
Kinematic viscosity at 50° C., cst/sec: 23.38
Nitrogen, mg/kg: 2,367
Vanadium, mg/kg: 37
Nickel, mg/kg: 29.0
Sodium, mg/kg: 1.0
Salt as NaCl, mg/l.: 29.0
Wax content, mass %: 1.2
Water content, vol %: <0.025

Pentanes to 165° C.

Yield, mass %: 5.73
Yield, vol %: 6.75

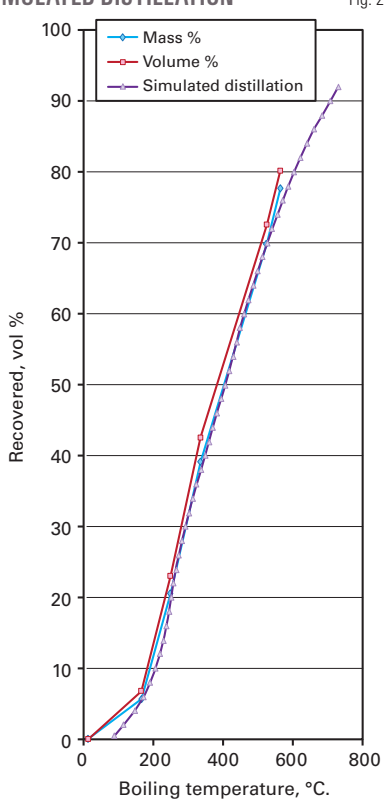
GIMBOA FIELD

Fig. 1



SIMULATED DISTILLATION

Fig. 2



Density at 15° C., kg/l.: 0.7742
Sulfur, mass %: 0.0337

165-250° C.

Yield, mass %: 14.86
Yield, vol %: 16.2
Density at 15° C., kg/l.: 0.8359
Sulfur, mass %: 0.0819

250-335° C.

Yield, mass %: 18.54
Yield, vol %: 19.51
Density at 15° C., kg/l.: 0.8660
Sulfur, mass %: 0.244

335-525° C.

Yield, mass %: 30.63
Yield, vol %: 30.10
Density at 15° C., kg/l.: 0.9273
Density at 70° C., kg/l.: 0.8890
Kinematic viscosity at 80° C., cst/sec: 14.82
Kinematic viscosity at 100° C., cst/sec: 8.337
Sulfur, mass %: 0.658

525-565° C.

Yield, mass %: 7.94
Yield, vol %: 7.60
Density at 15° C., kg/l.: 0.9527
Density at 70° C., kg/l.: 0.9147
Kinematic viscosity at 80° C., cst/sec: 73.76
Kinematic viscosity at 100° C., cst/sec: 32.37
Sulfur, mass %: 1.07 ✦

Reference

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NELSON-FARRAR COST INDEXES

Refinery construction (1946 Basis)
(Explained on p.145 of the Dec. 30, 1985, issue)

	1962	1980	2006	2007	2008	Dec. 2007	Nov. 2008	Dec. 2008
Pumps, compressors, etc.	222.5	777.3	1,758.2	1,844.4	1,949.8	1,997.7	2,003.4	1,997.7
Electrical machinery	189.5	394.7	520.2	517.3	515.6	515.0	516.4	515.0
Internal-comb. engines	183.4	512.6	959.7	974.6	990.9	1,006.7	1,007.3	1,006.7
Instruments	214.8	587.3	1,166.0	1,267.9	1,342.1	1,372.2	1,365.0	1,372.2
Heat exchangers	183.6	618.7	1,162.7	1,342.2	1,354.6	1,253.8	1,253.8	1,253.8
Misc. equip. average	198.8	578.1	1,113.3	1,189.3	1,230.6	1,229.1	1,229.2	1,229.1
Materials component	205.9	629.2	1,273.5	1,364.8	1,572.0	1,364.8	1,436.7	1,364.8
Labor component	258.8	951.9	2,497.8	2,601.4	2,704.3	2,783.8	2,781.7	2,783.8
Refinery (Inflation) Index	237.6	822.8	2,008.1	2,106.7	2,251.4	2,216.2	2,243.7	2,216.2

Refinery operating (1956 Basis)
(Explained on p.145 of the Dec. 30, 1985, issue)

	1962	1980	2006	2007	2008	Dec. 2007	Nov. 2008	Dec. 2008
Fuel cost	100.9	810.5	1,569.0	1,530.7	1,951.3	1,233.2	1,173.9	1,233.2
Labor cost	93.9	200.5	204.2	215.8	237.9	249.9	255.0	249.9
Wages	123.9	439.9	1,015.4	1,042.8	1,092.2	1,124.3	1,167.6	1,124.3
Productivity	131.8	226.3	497.5	483.4	460.8	449.9	457.9	449.9
Invest., maint., etc.	121.7	324.8	743.7	777.4	830.8	817.8	827.9	817.8
Chemical costs	96.7	229.2	365.4	385.9	472.5	406.8	455.7	406.8
Operating indexes								
Refinery	103.7	312.7	579.0	596.5	674.1	602.4	607.8	602.4
*Process units**	103.6	457.5	870.7	872.6	1,045.1	792.8	777.1	792.8

**Add separate index(es) for chemicals, if any are used. See current Quarterly Costimating, first issue, months of January, April, July, and October.*

These indexes are published in the first issue of each month. They are compiled by Gary Farrar, Journal Contributing Editor.

Indexes of selected individual items of equipment and materials are also published on the Costimating page in the first issue of the months of January, April, July, and October.

Indexes for selected equipment show moderate increase

Gary Farrar
Contributing Editor

Costs for six selected equipment items used in refining construction operations have been surveyed for the 3 years 2006-08. The table above shows Nelson-Farrar equipment indexes for these items.

Bubble trays showed the greatest increases in cost, rising to 1,859.2 in third-quarter 2008 from 1,434.6 in first-quarter 2006.

Four other items showed more modest increases. The tanks and pressure vessels category rose to 1,191.5 from 1,000.8 during the 36-month span. Tube stills increased to 706.3 from 549.5. Valves and fittings showed an index gain to 2,093.5 from 1,796.1. Fractionating towers showed a 220-point gain, increasing to 1,405.0 from 1,184.2 during the period.

The final category—nonmetallic building materials—showed a mild gain during the data compilation period. The beginning index value was 941.2, while the final value was 1,110.0. ✦

INDEXES FOR SELECTED EQUIPMENT ITEMS

Quarter	Bubble trays	Fractionating towers	Tube stills	Valves, fittings	Tanks, pressure vessels	Nonmetalic building materials
2006						
1st	1,434.6	1,184.2	549.5	1,796.1	1,000.8	941.2
2nd	1,458.6	1,192.3	566.3	1,813.0	1,003.2	967.6
3rd	1,514.7	1,219.3	603.6	1,866.3	1,023.0	984.8
4th	1,528.2	1,233.1	600.3	1,883.1	1,030.3	984.8
Year	**1,484.0**	**1,207.2**	**579.9**	**1,839.6**	**1,014.3**	**969.6**
2007						
1st	1,537.8	1,245.5	605.2	1,905.5	1,045.3	999.4
2nd	1,579.0	1,276.6	629.0	1,930.8	1,076.6	1,004.3
3rd	1,558.0	1,281.7	607.3	1,967.2	1,088.6	1,005.9
4th	1,570.9	1,293.4	606.7	1,971.9	1,095.2	1,003.2
Year	**1,561.4**	**1,274.3**	**612.05**	**1,943.9**	**1,076.4**	**1,003.2**
2008						
1st	1,596.7	1,308.2	624.2	1,994.4	1,108.5	1,018.3
2nd	1,753.0	1,376.9	727.7	2,035.5	1,153.0	1,037.7
3rd	1,859.2	1,428.1	798.3	2,072.0	1,189.7	1,095.4
4th	1,742.5	1,405.0	706.3	2,093.5	1,191.5	1,110.0
Year	**1,737.85**	**1,379.55**	**714.1**	**2,048.85**	**1,160.7**	**1,065.35**

ITEMIZED REFINING COST INDEXES

The cost indexes may be used to convert prices at any date to prices at other dates by ratios to the cost indexes of the same date. Item indexes are published each quarter (first week issue of January, April, July, and October). In addition the Nelson Construction and Operating Cost Indexes are published in the first issue of each month of Oil & Gas Journal.

Operating cost (based on 1956 = 100.0):	1954	1972	2006	2007	2008	Nov. 2008	*References	Index for earlier year in Costimating and Questions on Technology issues
Power, industrial electrical	98.5	131.2	850.2	897.3	939.2	938.1	Code 0543	No. 13, May 19, 1958
Fuel, refinery price	85.5	152.0	1,523.6	1,497.0	1,821,7	1,117,2	OGJ	No. 4, Mar. 17, 1958
Gulf cargoes	85.0	130.4	2,023.9	1,968.0	2,755.5	1,941.0	OGJ	No. 4, Mar. 17, 1958
NY barges	82.6	169.6	1,837.5	2,066.9	2,829.7	1,678.5	OGJ	No. 4, Mar. 17, 1958
Chicago low sulfur	—	—	1,765.8	2,046.7	2,754.0	1,527.7	OGJ	July 7, 1975
Western US	84.3	168.1	2,358.1	2,704.2	3,642.4	1,975.6	OGJ	No. 4, Mar. 17, 1958
Central US	60.2	128.1	1,765.9	1,886.9	2,615.7	3,144.8	OGJ	No. 4, Mar. 17, 1958
Natural gas at wellhead	83.5	190.3	6,306.5	6,118.7	7,260.5	4,327.5	Code 531-10-1	No. 4, Mar. 17, 1958
Inorganic chemicals	96.0	123.1	686.8	743.6	1,044.9	1,167.7	Code 613	Oct. 5, 1964
Acid, hydrofluoric	95.5	144.4	414.9	414.9	414.9	414.9	Code 613-0222	Apr. 3, 1963
Acid, sulfuric	100.0	140.7	397.4	397.4	397.4	397.4	Code 613-0281	No. 94, May 15, 1961
Platinum	92.9	121.1	1,344.5	1,557.8	1,524.5	1,114.7	Code 1022-02-73	July 5, 1965, p. 117
Sodium carbonate	90.9	119.4	452.4	490.1	688.5	769.6	Code 613-01-03	No. 58, Oct. 12, 1959
Sodium hydroxide	95.5	136.2	620.1	671.6	943.4	1,054.4	Code 613-01-04	No. 94, May 15, 1961
Sodium phosphate	97.4	107.0	733.7	733.7	733.7	733.7	Code 613-0267	No. 58, Oct. 12, 1959
Organic chemicals	100.0	87.4	764.5	799.9	958.1	858.3	Code 614	Oct. 5, 1964
Furfural	94.5	137.5	1,103.1	1,174.1	1,382.7	1,238.7	Chemical Marketing Reporter	No. 58, Oct. 12, 1959
MEK, tank-car lots	82.6	87.5	625.0	625.0	625.0	625.0	Reporter	
Phenol	90.4	47.1	374.9	413.0	479.4	500.3	Code 614-0241	No. 58, Oct. 12, 1959

ITEMIZED REFINING COST INDEXES

Operating cost (based on 1956 = 100.0):	1954	1972	2006	2007	2008	Nov. 2008	*References	Index for earlier year in Costimating and Questions on Technology issues
Operating labor cost (1956 = 100)								
Wages & benefits	88.7	210.0	1,015.4	1,042.8	1,092.2	1,167.6	Employ & Earn	No. 41, Feb. 16, 1969
Productivity	97.2	197.0	497.5	483.4	460.8	457.9	Employ & Earn	No. 41, Feb. 16, 1969
Construction labor cost (1946 = 100)								
Skilled const.	174.6	499.9	2,240.7	2,344.4	2,434.3	2,498.9	Eng. News Record	No. 55, Nov. 3, 1949
Common labor	192.1	630.6	2,971.7	3,083.0	3,200.4	3,306.9	Eng. News Record	No. 55, Nov. 3, 1949
Refinery cost	183.3	545.9	2,497.8	2,601.4	2,704.3	2,781.7	OGJ	May 15, 1967
Equipment or materials (1946 = 100):								
Bubble tray	161.4	324.4	1,484.0	1,561.4	1,737.8	1,742.5	Computed	July 8, 1962, p. 113
Building materials (nonmetallic)	143.6	212.4	969.6	1,003.2	1,065.3	1,110.0	Code 13	No. 61, Dec. 15, 1949
Brick—building	144.7	252.5	1,408.6	1,429.1	1,427.6	1,434.0	Code 1342	No. 20, Mar. 3, 1949
Brick—fireclay	193.1	322.8	1,540.5	1,616.2	1,742.9	1,805.6	Code 135	May 30, 1955
Castings, iron	188.1	274.9	1,351.3	1,414.3	1,576.6	1,607.7	Code 1015	Apr. 1, 1963
Clay products (structural, etc.)	159.1	342.0	951.6	963.2	972.9	981.9	Code 134	No. 20, Mar. 3, 1949
Concrete ingredients	141.1	218.4	1,092.0	1,172.2	1,231.3	1,242.2	Code 132	No. 22, Mar. 17, 1949
Concrete products	138.5	199.6	921.1	961.6	997.3	1,015.7	Code 133	Oct. 2, 1967, p. 112
Electrical machinery	159.9	216.3	520.2	517.3	515.6	516.4	Code 117	May 2, 1955
Motors and generators	157.7	211.0	880.3	917.1	964.2	984.4	Code 1173	May 2, 1955
Switchgear	171.2	271.0	1,147.3	1,212.2	1,254.4	1,277.7	Code 1175	May 2, 1955
Transformers	161.9	149.3	612.5	696.9	766.4	755.7	Code 1174	No. 31, May 19, 1949
Engines (combustion)	150.5	233.3	959.7	974.6	990.9	1,007.3	Code 1194	No. 36, June 23, 1949
Exchangers (composite)	171.7	274.3	1,162.7	1,342.2	1,354.6	1,253.8	Manufacturer	Mar. 16, 1964
Copper base	190.7	266.7	1,059.4	1,201.8	1,221.6	1,161.0	Manufacturer	Mar. 16, 1964
Carbon steel	156.8	281.9	1,162.1	1,344.7	1,369.2	1,287.3	Manufacturer	Mar. 16, 1964
Stainless steel (304)	—	—	1,174.8	1,322.1	1,319.5	1,183.0	Manufacturer	July 1, 1991
Fractionating towers	151.0	278.5	1,207.2	1,274.3	1,379.5	1,405.0	Computed	June 8, 1963, p. 133
Hand tools	173.8	346.5	1,792.5	1,830.6	1,918.2	1,972.6	Code 1042	June 27, 1955
Instruments (composite)	154.6	328.4	1,166.0	1,267.9	1,342.1	1,365.0	Computed	No. 34, June 9, 1949
Insulation (composite)	198.5	272.4	2,257.4	2,258.6	2,213.1	2,244.3	Manufacturer	July 4, 1988, p. 193
Lumber (composite):	197.8	353.4	1,309.8	1,204.1	1,134.5	1,080.4	Code 81	No. 7, Dec. 2, 1948
Southern pine	181.2	303.9	984.3	846.4	780.3	730.2	Code 81102	No. 7, Dec. 2, 1948
Redwood, all heart	238.0	310.6	1,948.1	1,744.3	1,607.9	1,503.8	Code 811-0332	July 5, 1965, p. 117
Machinery								
General purpose	159.9	278.5	1,213.7	1,271.8	1,338.9	1,372.8	Code 114	Feb. 17, 1949
Construction	165.9	324.4	1,559.7	1,594.4	1,645.6	1,685.6	Code 112	Apr. 1, 1968, p. 184
Oil field	161.9	269.1	1,599.1	1,715.8	1,858.8	1,903.4	Code 1191	Oct. 10, 1955
Paints—prepared	159.0	231.8	1,040.8	1,078.5	1,150.1	1,184.6	Code 621	May 16, 1955
Pipe								
Gray iron pressure	195.0	346.9	2,687.9	2,730.8	2,865.0	3,128.8	Code 1015-0239	Jan. 3, 1983
Standard carbon	182.7	319.9	2,306.9	2,299.2	2,904.9	3,090.5	Code 1017-0611	Jan. 3, 1983
Pumps, compressors, etc.	166.5	337.5	1,758.2	1,758.4	1,949.8	2,003.4	Code 1141	No. 29, May 5, 1949
Steel-mill products	187.1	330.6	1,527.5	1,620.0	1,973.5	1,922.2	Code 1017	Jan. 3, 1983
Alloy bars	198.7	349.4	1,311.8	1,239.7	1,469.8	1,340.9	Code 1017-0831	Apr. 1, 1963
Cold-rolled sheets	187.0	365.5	1,658.4	1,916.6	1,935.6	1,854.8	Code 1017-0711	Jan. 3, 1983
Alloy sheets	177.0	225.9	862.4	996.7	1,006.6	964.5	Code 1017-0733	Jan. 3, 1983
Stainless strip	169.0	221.2	920.7	1,064.2	1,074.7	1,029.8	Code 1017-0755	Jan. 3, 1983
Structural carbon, plates	193.4	386.7	1,766.6	1,945.3	2,383.6	2,194.2	Code 1017-0400	Jan. 3, 1983
Welded carbon tubing	180.0	265.5	2,337.3	2,329.6	2,943.2	3,131.4	Code 1017-0622	Jan. 3, 1983
Tanks and pressure vessels	147.3	246.4	1,014.3	1,076.4	1,160.7	1,191.5	Code 1072	No. 5, Nov. 18, 1949
Tube stills	123.0	125.3	579.9	612.0	714.1	706.3	Computed	Oct. 1, 1962
Valves and fittings	197.0	350.9	1,839.6	1,943.9	2,048.8	2,093.5	Code 1149	No. 46, Sept. 1, 1940
Nelson-Farrar Refinery (Inflation Index)								
(1946)	179.8	438.5	2,008.1	2,106.7	2,251.4	2,243.7	OGJ	May 15, 1969
Nelson-Farrar Refinery Operation								
(1956)	88.7	118.5	579.0	596.5	674.2	607.8	OGJ	No. 2, Mar. 3, 1958
Nelson-Farrar Refinery Process								
(1956)	88.4	147.0	870.7	872.6	1,045.1	777.1	OGJ	No. 2, Mar. 3, 1958

*Code refers to the index number of the Bureau of Statistics, US Department of Labor, "Wholesale Prices" Itemized Cost Indexes, Oil & Gas Journal.

EXTERNAL CORROSION—1

Study investigates damage to cased pipeline segments

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New analysis shows pipelines using shorted casings are more susceptible to corrosion than pipelines using nonshorted casings. The preferential location of anomalies on carrier pipe inside casings is 2% of the casing length, or about 3 ft on average from either end of the casing. Beyond 3 ft, peak anomalies are relatively uniformly distributed. The preferential location contains 25% of peak anomalies, or 10 times the likelihood of anomalies elsewhere in the casing.

Operators generally consider cased pipe segments to be safe because time-independent threats, including third-party excavation and outside force damage, are largely eliminated. The possibly enhanced external corrosion of the carrier caused by the casing, however, compromises this safety argument.

No sound evidence exists to suggest that cased segments are safer than uncased ones in terms of leaks per mile or scheduled or immediate responses per mile. A 1984 survey instead revealed that, of 14 countries, five reported corrosion damage on the carrier pipe when casings were used, but none reported corrosion damage on the carrier pipe at crossings where casings were not used.[1] External corrosion on the carrier pipe can become more severe than on uncased segments when the carrier pipe has access to electrolyte due to condensation from vent pipes open to air, or in the presence of a short if ground water gains access into the casing-carrier annulus when the casing end seals are either lacking or do not properly seal.

Fig. 1 shows the major elements of a typical casing, including vent pipes, end seals, and insulator spacers.

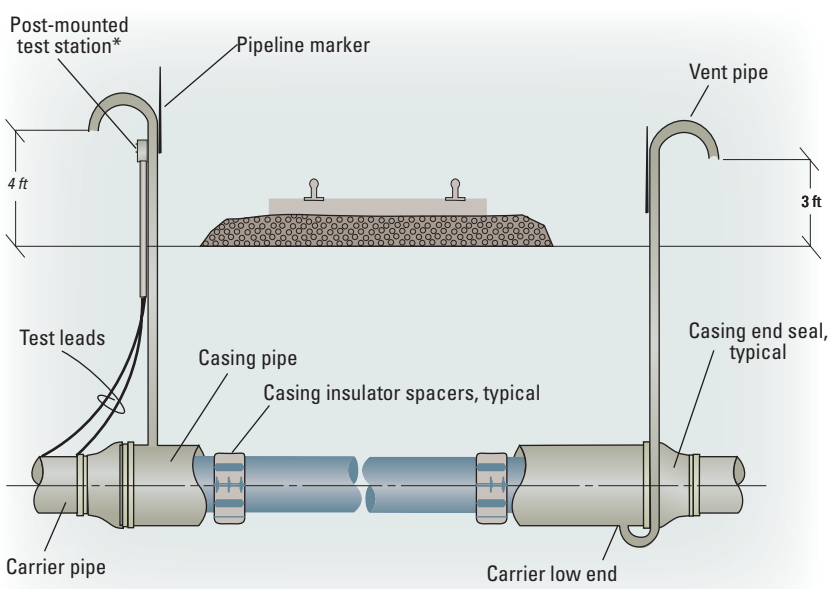
Based on presentation to NACE Corrosion 2009, Atlanta, Mar. 22-26, 2009.

Background

When a thin layer of electrolyte is condensed at the carrier pipe's coating holidays, a high diffusion rate of oxygen can lead to a high corrosion rate. For such atmospheric corrosion,

TYPICAL CASING SEGMENT COMPONENTS

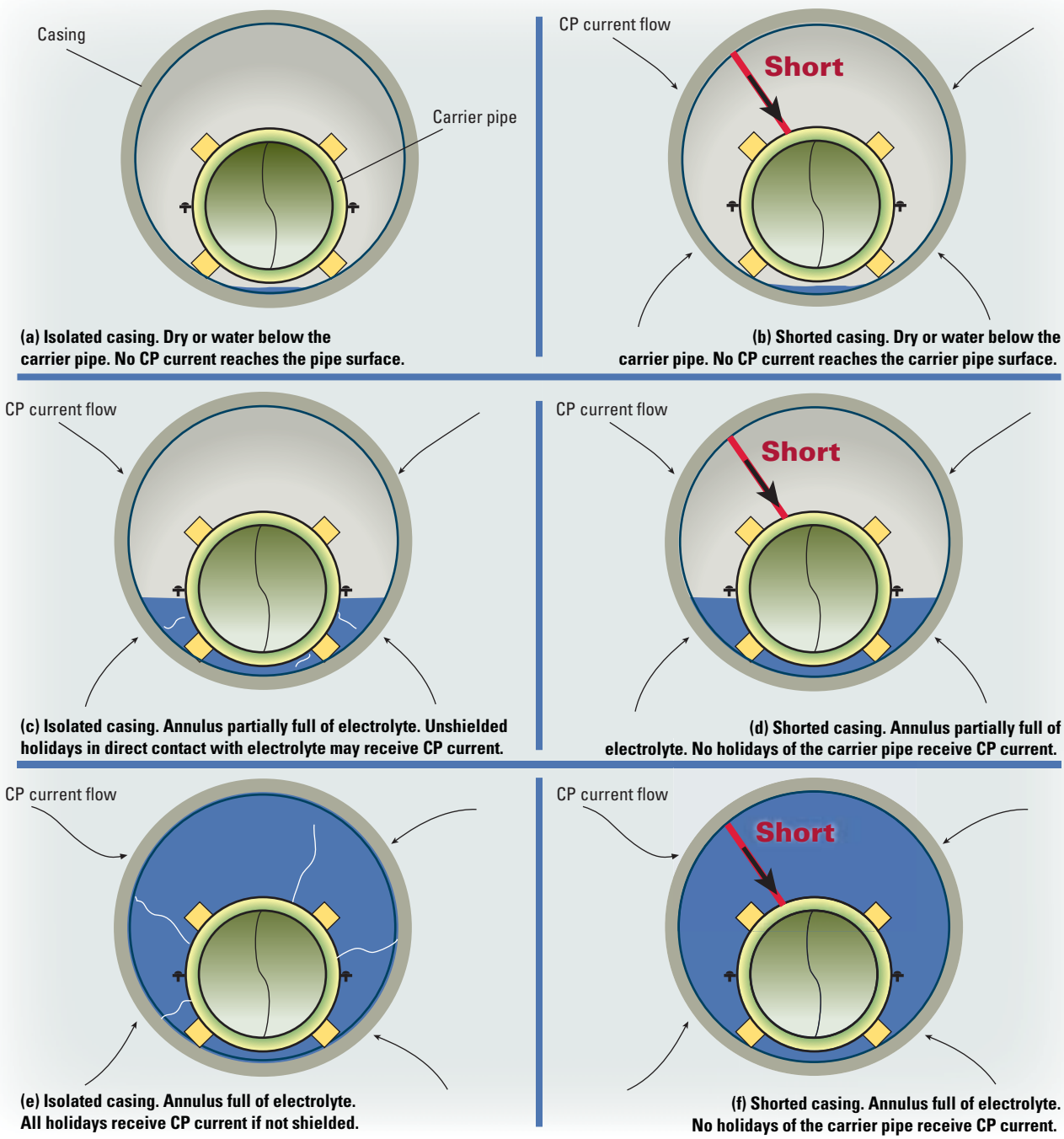
Fig. 1



*Test station required at one end of casing only. Install at most convenient or protected site.

Short conditions

Fig. 2



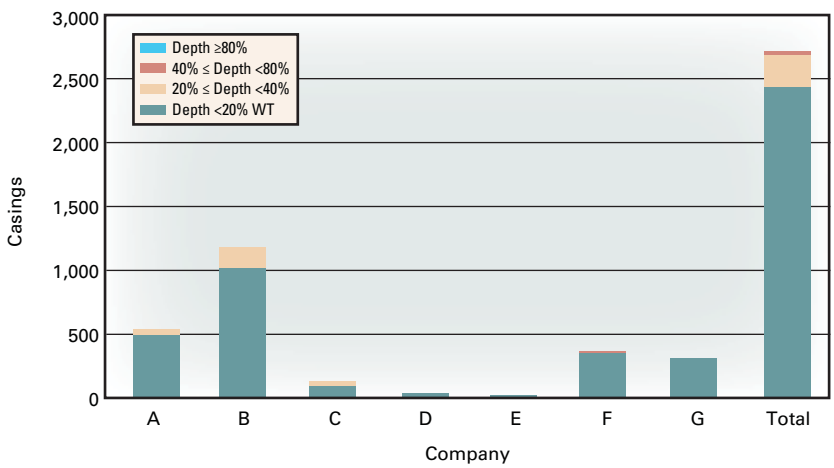
the absence of continuous conductive electrolyte in the annulus between the casing and the carrier pipe (Figs. 2a and b) can cause external CP to be ineffective in protecting the carrier pipe. Partially filling the annulus with electrolyte (Figs. 2c and d) can still allow atmospheric corrosion at the holidays above the electrolyte-air interface due to the air being humid or possibly saturated by water vapor.

In both cases, if the casing happens to be located near a compressor station, elevated temperature can accelerate the corrosion problem. Elevated temperatures can cause a soft coating on carrier pipe, such as hot applied asphalt, to melt away and therefore turn the cased segment into a bare pipe. The elevated temperatures on the cased segment can create steam in the annulus of the casing, which can cause condensation to form along the top inside of the casing. The condensed water can then drip

These photos show corrosion beneath wood pieces attached to the transmission pipeline by wire as casing spacers. The right photograph is a detail of the same damage shown in the left (photo from Kinder Morgan; Fig. 3).

ANOMALY DEPTHS

Fig. 4



on the bare line causing it to corrode, followed by formation of a protective oxide.

Continuous dripping of condensed water, however, can create a new cycle of corrosion by washing away the oxide. Such cyclic corrosion can create long lengths of defects along the axis of the carrier pipe, which can result in rupture along this corrosion path. An example of this failure is the 1985 incident of the Texas Eastern Gas Pipeline Co.,[2] to be described in the conclusion of this article (OGJ, Apr. 20, 2009).

For the annulus partially filled by electrolyte (Figs. 2c and d), near the interface between the electrolyte and air, a differential oxygen concentration cell can exist. A coating holiday with a short distance below the interface is in an anaerobic environment and serves as the anode. The aerated holidays across and close to the interface serve as the cathode. This oxygen concentration cell is active when CP is shielded by the casing wall, insulator spacers, or made worse by the presence of a metallic short between the casing and the carrier pipe (Fig. 2d).

The metallic short enhances corrosion rate via two paths. First, it removes CP protection as the CP current seeks the lowest electrical resistance path to return to the source, which is through the casing pipe returning to the carrier pipe at the metal-to-metal contact. Second, the short can result in galvanic coupling between the casing wall inner surface and the carrier pipe at the coating holidays. The more positive potential of the casing wall inner surface can shift in the positive direction of the carrier pipe potentials at the coating holidays, resulting in a higher corrosion rate.

A metallic short can develop in several ways, including:[3]

- Movement or sagging of the carrier pipe in a casing without spacers or with spacers that were incorrectly installed or failed.
- Intentional shorting.
- An accidental short developed between test leads and vent pipes.

CP can offer protection of the carrier pipe holidays immersed in electrolyte in the absence of a metallic short (Figs. 2c and e) and the protection can meet the NACE RP 0169 criteria[4] at unshielded holidays with a sufficient polarization to the casing wall outer surface. A metallic short (Figs. 2d and f), however, can fully or partially remove the CP protection depending on the relative resistance of the metallic contact to the annulus electrolyte. The latter resistance depends on factors including:

- Presence or absence of coating(s) on the casing wall.
- Quality of carrier coating.
- Ground water resistivity.
- Annulus space.

• Casing length.

Casings can also obstruct standard methods of direct examination or indirect inspection of the carrier pipe,[5] making it more difficult to identify a corrosion problem. Standard procedures for indirect inspections or direct examinations of cased crossings therefore may need modification to address these concerns or new technologies may need to be developed to meet this need.

External corrosion of cased pipe segments is complex and can be influenced by many factors, including:

• Design differences (requirements vary through history).
• Steel or weld type.
• Installation year.
• Historical CP interruptions.
• Historical leaks.
• Historical shorts, short clearance.
• Casing extensions to accommodate road work.
• Bare or coated carrier or casing.
• Coating types, conditions.
• Bacterial presence.
• Local weather conditions.
• Seasonal water table changes.
• Soil electrolyte corrosivity.
• Local air corrosivity related to geographic locations such as coastal or grass-forest lands vs. desert, industrial areas vs. agricultural areas, etc.
• Issues such as stray currents.

Fig. 3 shows an example of external corrosion of a carrier pipe in a casing due to use of a wooden spacer. The wooden spacer possibly shielded CP, which otherwise would have provided protection. Corrosion under wooden spacers often occurs in older cased segments.

The conclusion of this article (OGJ, Apr. 20, 2009) will focus on:

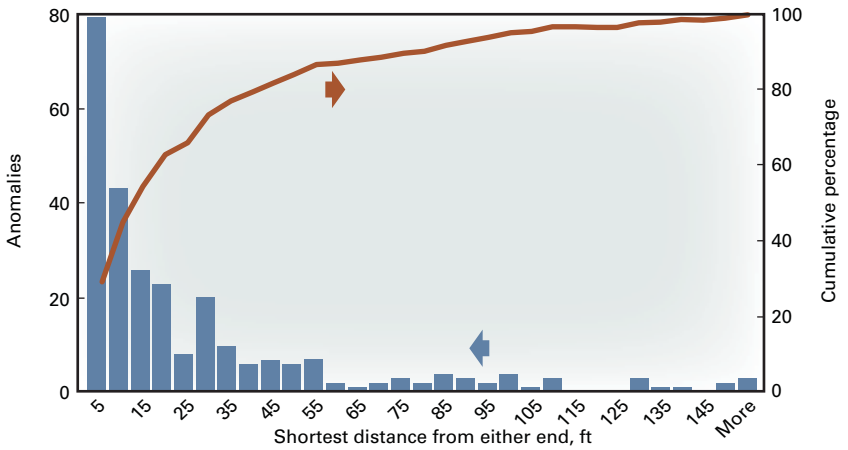
• Statistical analysis of in-line inspection (ILI) anomaly data provided by seven operators participating in the subject program.
• Evaluation of the effects of metallic shorts vs. nonshort conditions.
• Investigation of historical casing failures.
• Comparison of the number of scheduled or immediate responses/mile for cased vs. noncased segments.

The statistical analysis of ILI anomaly data includes:

• Percentage of cased segments with or without anomalies.
• Anomaly indication distribution vs. distance from either end of a cased segment.
• Casing length distribution.
• Anomaly depth, length, and safety factor distribution.

PEAK ANOMALY VS. SHORTEST DISTANCE*

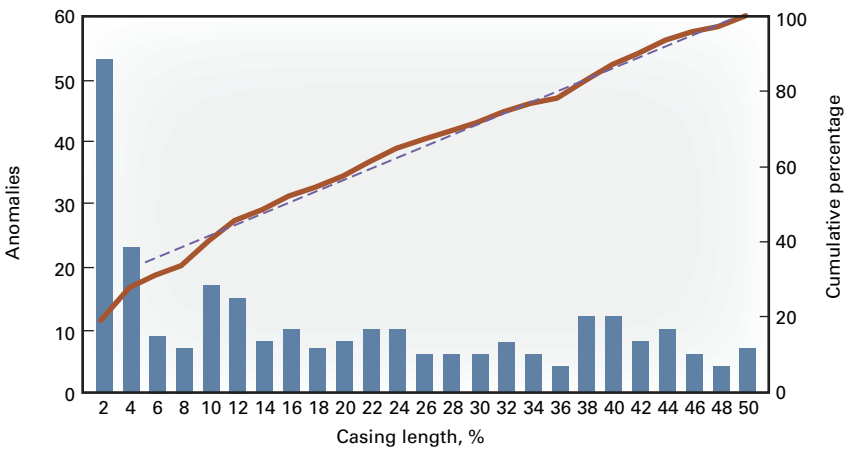
Fig. 5



*Only the deepest anomaly in a casing with its depth ≥20% WT is used for this analysis.

PEAK ANOMALY VS. RELATIVE DISTANCE

Fig. 6



Data collection, analyses

Table 1 shows a template for collecting ILI data developed by the operators. Recognition that collecting field data was voluntary and could be time-consuming if not focused only on the parameters of this study kept the format simple. Analyses focused on the information contained in the red italicized columns.

• *Overall casing statistics.* Seven companies contributed their ILI data, with nearly all data obtained from pig runs since 2004. One company provided only data with peak anomaly depths of 20% WT or greater, while other

IN-LINE INSPECTION DATA TEMPLATE

Pipeline segment	MP	Casing #	ILI year	Corrosion >20%	*Maximum peak depth, %WT*	*Anomaly length, ft*	*Casing length*	*Shortest distance from casing end*	Predicted burst pressure	*PF/ MAOP*

companies provided data for all cased pipe segments including those with no anomalies or with anomalies of any depth.

Table 2 provides a summary of the number of casings studied and the ranges of anomaly depths.

Among the total of 2,733 cased pipe segments, 2,461 either do not have an anomaly or have anomalies with a depth less than 20% WT, accounting for 90% of the population of cased crossings. Under Modified B31G criteria,[6] these cased segments require no response action.

Only one cased segment has an anomaly depth exceeding 80% WT, accounting for 0.04% of the total cased pipe segments. If the anomaly is verified by direct examination, B31G criteria[7] require the section of pipe containing the anomaly be replaced in order to prevent a leak.

Slightly less than 10% of the total 2,733 cased pipe segments—271 cased segments—contain anomalies with depths between 20% and 80% WT. Modified B31G criteria require a scheduled response or reduction of maximum allowable operating pressure (MAOP).

Table 2 also includes the breakdown for the number of cased pipe segments with anomaly depths between 20% and 80% WT (including 20% WT).

Fig. 4 is a visual demonstration of the casing data in Table 2. The cased pipe segment with an anomaly depth greater than 80% WT is hardly seen (blue color), while the casings with anomaly depths less than 20% WT account for the majority (green color). A significant reduction in the number of the cased pipe segments emerges as anomaly depth increases.

- *Data limitations.* When reading or interpreting the statistical data, one must keep its limitations in mind. The accuracy of ILI tools in finding and sizing anomalies depends on many factors including, but not limited to:

—Types of pigging tools used; their detection limits.[8]

—Qualification, competence, and experience of personnel using the tools and interpreting data.

—Software version used to interpret the data.

—Operator ILI procedures, requirements.

- *Basis of statistical analyses.* Statistical analyses counted and used only the deepest anomaly in a casing (i.e., one anomaly/cased pipe segment) 20%

CASING LENGTH DISTRIBUTION

Fig. 7

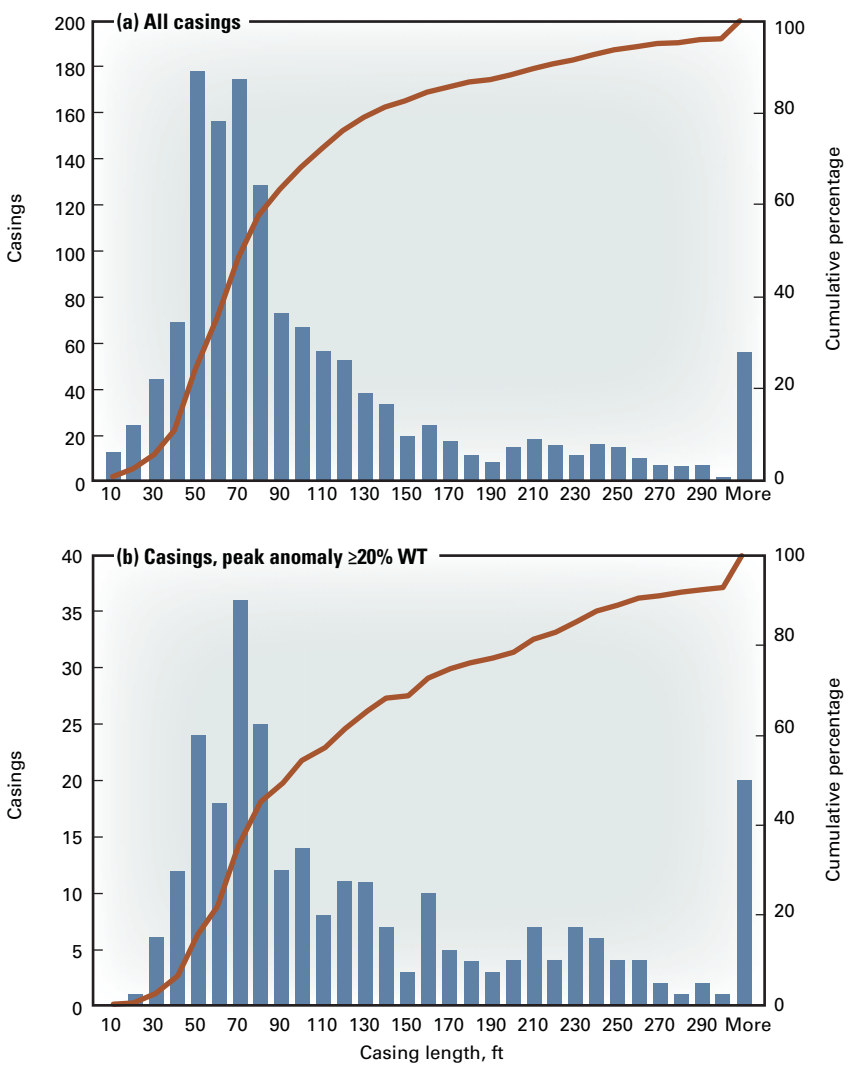


Table 1

Class location	OD	MAOP	WT	SMYS	*Shorted?*

WT or greater in depth. The deepest anomaly represents roughly the most severe corrosion damage anomaly on a cased pipe segment and using it avoids any preferential treatment of pipe segments containing many more anomalies than others.

The deepest anomaly, however, may not always be the most severe because the severity of an anomaly also depends on its length. For multiple casings on one pipe section (with the same carrier pipe diameter, wall thickness, and operating conditions) the failure (burst) pressure (FP) can measure the severity of an anomaly because FP includes the effect of both anomaly length and depth.

But casings on different pipe sections with different carrier pipe diameters or WT, FP alone does not provide a proper basis for comparing anomaly severities. Such circumstances best use the factor of safety (FP/MAOP), which is independent of pipe diameter and WT.

Statistical analyses of a few key variables identified as most useful for this article follow.

• *Deepest anomaly distribution based on shortest distance from either end of casing.* Fig. 5 shows the number and cumulative percentage of anomalies vs. shortest distance from either end of the casing. A sharp decrease in the number of anomalies (represented by the height of blue columns) appears as the shortest distance increases.

Beyond 60 ft, the number becomes small and sparsely distributed, particularly after 110 ft. The number of anomalies within 60 ft account for 87% (shown on the pink curve). Not shown explicitly, 22% of all the 272 anomalies lie within 2 ft and 25% within 3 ft of either end of the casings.

This absolute shortest distance approach, however, limits determining the distribution of anomalies along cased pipe segments. When the shortest distance is large (~500 ft), only anomalies on the carrier pipe deep within those long casings (>1,000 ft) can be counted, yielding far fewer anomalies compared to those having a small shortest distance.

Casing length varies from 17.4 ft to 1,584.8 ft in the study used for this article. Using absolute shortest distance therefore masks the true distribution of the anomalies along the length of individual cased pipe segments and overestimates the percentage of anomalies near the ends of cased pipe segments.

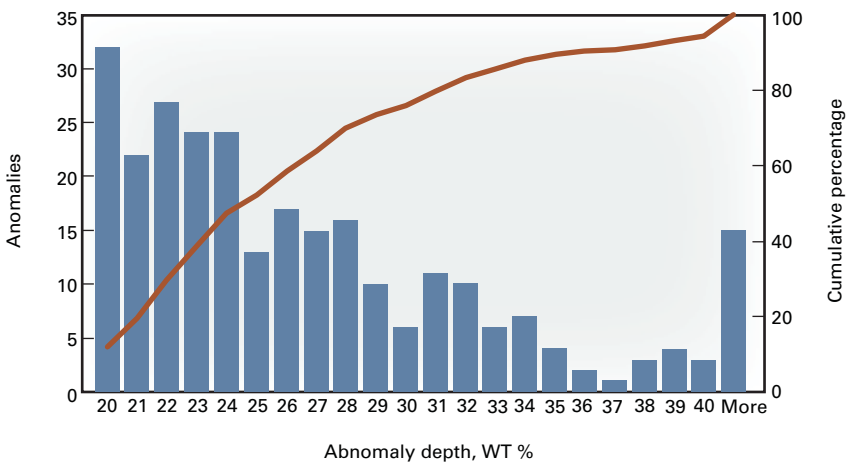
Relative shortest distance, defined as the ratio of shortest distance to total casing length, provides a more objective statistical description of how peak anomalies are distributed along the length of individual cased pipe segments.

Fig. 6 shows the first 2% of casing length accounting for roughly 20% of anomalies. Anomalies along the rest of the cased pipe segments are distributed relatively uniformly as demonstrated by the dotted gray line, which passes near most of the pink data points. This distribution shows a preferential distribution of anomalies occurring only near the ends of cased pipe segments.

An average casing length of 136.5 ft yields a preferential distribution dis-

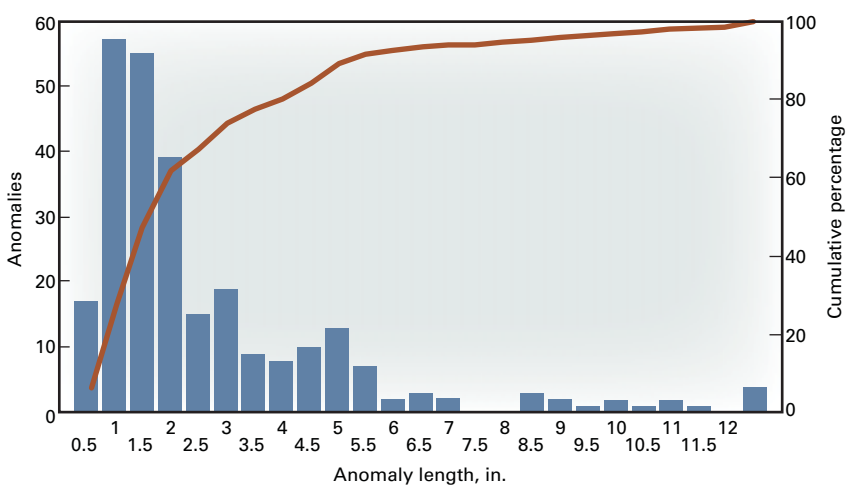
PEAK ANOMALY VS. RELATIVE PEAK DEPTHS

Fig. 8



PEAK ANOMALY VS. LENGTH

Fig. 9



tance from either end of cased pipe of: 2% × 136.5 ft = 2.7 ft, roughly consistent with the 25% of anomalies found within 3 ft of either end of cased pipe segments shown in Fig. 5. Although there appears to be a preferential distribution of peak anomalies to the ends of cased pipe segments, however, 75% of the anomalies still lie more than 3 ft from the ends of the casings.

On average, by excavating only 3 ft along each end of casing, an operator would gain roughly 20-25% confidence of locating the peak anomaly within a cased pipe segment. Although this confidence is not as high as desired, the opposite assumption that anomalies are randomly located along the cased pipe segment would require excavation of about 10 times this length to gain the same confidence. The cost and personal safety risk of the extended excavation could be dramatically higher given the typical location of casings under railroads or highways.

• *Casing length distribution.* The preceding determination of preferential location of the peak anomaly in a cased pipe segment underlines the importance of understanding the distribution of casing length. Researchers performed a statistical analysis of casing length both for all casings whose lengths were received for the study (Fig. 7a) and for casings containing anomalies with depth ≥20% WT (Fig. 7b).

Of the 2,733 casings surveyed, a total of 1,357 were analyzed for Fig. 7a. The lengths of the other 1,376 casings were not provided. Of the 1,357 casings analyzed, Fig. 7a shows 73% having a length of 30-120 ft. Average length measured 104.3 ft; median 71.6 ft.

For the 272 cased pipe segments containing peak anomalies with depth ≥20% WT, casing length varied between 17.4 ft and 1,584.8 ft, with an average of 136.5 ft and median of 93 ft (Fig. 7b). Both the average and median are respectively greater than the 1,357 casings containing no anomaly or containing peak anomalies of any depth, suggesting that longer casing tends to have a higher chance of containing a peak anomaly ≥20% WT in depth.

• *Anomaly distribution based on anomaly depth, length.* Fig. 8 shows the number and cumulative percentage of anomalies vs. maximum depth (% WT). The first and second columns from the left represent anomalies with depths of 20% WT and 21% WT, respectively. Peak anomalies less than 20% WT in depth are excluded from this analysis. The average depth measures 27.4% WT, maximum 84% WT, and median 25% WT.

About 52% of the anomalies (pink curve) are within the first 5% span of maximum depth, between 20% and 25% WT, inclusive. The next 5% span (between 25% and 30% WT, including 30%), contains just 23% of anomalies, with >30% WT depth accounting for only 24% of anomalies.

Fig. 9 shows the number and cumulative percentage of anomalies vs. anomaly length. Slightly more than 60% of anomalies have a length <2 in., and only 11% have a length >5 in. The average length measures 2.6 in., minimum 0.2 in., maximum 17.9 in., and median 1.6 in.

CASING DATA, OVERALL STATISTICAL ANALYSES

Table 2

Company	A	B	C	D	E	F	G	Total
Total casings	559	1,200	149	65	36	376	348	2,733
Depth, <20% WT	509	1,056	116	57	31	364	328	2,461
% of total	91.06	88.00	77.85	87.69	86.11	96.81	94.25	90.05
20% ≤ depth <30%	34	117	20	5	3	8	14	201
30% ≤ depth <40%	13	25	8	1	0	3	3	53
40% ≤ depth <80%	3	2	4	2	2	1	3	17
20% ≤ depth <80%	50	144	32	8	5	12	20	271
% of total	8.94	12.00	21.48	12.31	13.89	3.19	5.75	9.92
Depth ≥80%	0	0	1	0	0	0	0	1
% of total	0.00	0.00	0.67	0.00	0.00	0.00	0.00	0.04

Acknowledgments

Preparation of this article used results of a project sponsored by the Interstate Natural Gas Association of America (INGAA) Foundation and the American Gas Association (AGA).[9] The following companies provided ILI data used for this article:

- Dominion Transmission Inc.
- Kinder Morgan.
- Pacific Gas & Electric Co.
- Questar.
- Southern California Gas.
- Spectra Energy.
- Williams Pipeline.

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Figs. 1 and 2 were modified from a presentation at NACE Corrosion 2006 by Earl Kirkpatrick, ELK Engineering Associates Inc. ✦

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Correction

In "US LNG imports in 2008 signal unexpected role for gas markets" by Robert Eric Borgstrom and David Anthony Foti (Mar. 9, 2009, p. 56), the vertical axis on Fig. 3 should have read –8% to 12%, not 0% to 12%.

Key Energy Services Inc.,

Houston, has appointed Blake Hutchinson vice-president, corporate development. He will lead efforts to identify and evaluate international business development opportunities in the Eastern Hemisphere and serve as Key's investor relations executive. Hutchinson has extensive financial investment experience in the oil and gas industry, having worked at Daniel Breen & Co., Howard Weil Inc., and most recently at Treaty Oak Capital Management in Austin. He has a BA in economics and managerial studies.


Hutchinson

Key Energy Services is the world's largest rig-based well services company. The company provides oil field services including well servicing, pressure pumping, fishing and rental tools, and electric wireline, with operations in all major onshore oil and gas producing regions of the continental US and in Argentina and Mexico.

Spectraseis,

Zurich, has entered into a long-term, strategic partnership with Saudi Makamin Co. Spectraseis and Makamin are forming a joint new venture based in Dhahran, Saudi Arabia, to market and deliver low-frequency geophysical solutions in the Middle East. Makamin has also become an owner of Spectraseis, alongside the company's major shareholders Warburg Pincus and StatoilHydro Ventures.

Established in 2003, Spectraseis is the principal technology and service provider in the field of low-frequency passive seismic geophysical surveys and data analysis.

Established in 2008, Makamin is a Saudi oil field services group that is a building a portfolio of new technology and service offerings for operators in the Persian Gulf region, including exploration technology, drilling services, advanced production systems, well services, and integrated project management.

Knight Oil Tools,

Lafayette, La., has named Robert C. Veazey as its new CFO. He will oversee all financial affairs of Knight's subsidiaries and affiliates. Veazey joins Knight after the sale of Veazey & Co., a firm of CPAs and business consultants he founded. He is a University of Louisiana graduate and a member of the American Institute of Certified Public Accountants, the Louisiana Society of Certified Public Accountants, the National Association of Certified Valuation Analysts, and the Association of Certified Merger and Acquisition Analysts.


Veazey

Knight Oil Tools is the largest privately held rental and fishing tools business in the oil and gas industry and includes Knight Fishing Services, Knight Well Services, and Knight Manufacturing.

Noble Denton,

London, has announced two executive appointments within its American operations. The company appointed Michael Lowe as global business team group director, project management services, and Vernon Luning as president, Lowe Offshore International, US project management services. Lowe will be responsible for developing the company's global field development project management capabilities. He furthers a 35-year career in domestic and international oil and gas project management and market development. Lowe managed many upstream projects in the US, Europe, New Zealand, Ecuador, Brazil, Thailand, China, and Mexico. He is the founder of Lowe Offshore International and had previously assumed the role of Lowe Offshore president from 1981 to August 2007, when the company was acquired by Noble Denton. Luning previously served as senior project manager with Lowe Offshore and brings more than 35 years of industry experience in offshore construction management. He joined Lowe in 2002 and has led several field development projects in the Gulf of Mexico.

In addition, Arthur Aragon, the current group director for project management services, will be appointed to Brazil to focus exclusively on opportunities for the company's project services there.

Noble Denton is a leading worldwide provider of life cycle marine and offshore engineering services to the oil and gas, marine, and renewables industries.

Baker Hughes Inc.,

Houston, has appointed Arthur L. Soucy vice-president, supply chain. Most recently, he was vice-president, global supply chain, for Pratt & Whitney, a United Technology Corp. company. Soucy held a variety of management positions across different business units since beginning with Pratt & Whitney in 1995. From 1982 to 1995, he worked for United Technology's Hamilton Standard, serving in various manufacturing engineering and product development management roles. Soucy has a BS from Lesley University in Cambridge, Mass., and an MBA from Massachusetts Institute of Technology.

Baker Hughes provides reservoir consulting, drilling, formation evaluation, completion, and production products and services to the worldwide oil and gas industry.

Paratherm Corp.,

West Conshohocken, Pa., has promoted Rich Clements to COO and vice-president of operations. Previously, he was sales manager since 2007. He will manage Paratherm's day-to-day operations, drawing from his experiences in previous positions as product director, plant manager, and plant engineer. Clements will introduce two new fluid products, broadening Paratherm's spectrum of offerings and answering specific market-driven needs. Research and development are currently concluding so that the products can be commercialized later in 2009. Clements has a chemical engineering degree from the University of Maryland. With more than 20 years of executive-level sales management experience, much of it with a Fortune 500 company in industrial (chemical-related) sales, he will continue to oversee the sales department.


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Founded in 1988, Paratherm has become a leading US manufacturer of specialized heat transfer fluids and system cleaners serving the chemical, plastics, and other industries.

CGGVeritas,

Paris, has expanded its processing and imaging hub in Cairo. With its powerful computer facility and high-speed link to the company's massive EAME computer hub in the UK, the new expanded regional hub can process all types of seismic data, including wide-azimuth and multi-azimuth, through the latest advanced imaging techniques. Located in the Free Zone of Nasr City, Cairo, the hub employs 70 professionals, including more than 40 geophysicists.

CGGVeritas is a leading international pure-play geophysical company delivering a wide range of technologies, services, and equipment through Sercel to its broad base of customers mainly throughout the global oil and gas industry.

GE Oil & Gas,

Florence, Italy, has inaugurated its new, consolidated Americas offices in Houston. The new GE Oil & Gas building is the first site to house all GE Oil & Gas businesses at one location since the acquisition of PII Pipeline Solutions in 2002, VetcoGray in 2007, and Hydril Pressure Control in 2008. Almost 500 employees from sales, engineering, commercial operations, and other supporting functions have relocated to the new office building. This regional headquarters will support all segments of the oil and gas industry—from drilling and completion to production, LNG, pipeline, refining, and petrochemicals. In addition to the new office building, GE Oil & Gas also has three manufacturing plants and two service centers in the Houston area. In total, GE Oil & Gas employs more than 2,000 people in the Houston area.

GE Oil & Gas is a world leader in advanced technology equipment and services for all segments of the oil and gas industry, offering solutions for production, LNG, transportation, storage, refineries, and petrochemicals. It also provides pipeline integrity solutions, including software and asset management. With its acquisition of VetcoGray and Hydril Pressure Control, GE Oil & Gas now offers additional products, systems, and services for drilling, completion, and production within onshore, offshore, and subsea applications.

MODEC Inc.,


Yaji

Tokyo, has made three major executive appointments. Nobuhiro Yaji has been promoted to president and co-CEO of MODEC Inc. Shashank Karve has been promoted to managing director and COO of MODEC Inc. as well as chairman and CEO of MODEC International Inc. Kenji Yamada has assumed the role of chairman and continues as CEO of MODEC Inc. Yaji has been a member of the board of directors of MODEC Inc. since 1999 and previously served as managing director and COO. Karve continues to serve as a member of the board of MODEC Inc., a position he has held since 2004. Yamada has served as a director of the company since 1997 and has held the position of CEO since 2001.


Karve


Yamada

Founded in 1968, MODEC is a general contractor specializing in engineering, procurement, construction, and installation, as well as operation and maintenance of floating production systems. MODEC also provides SOFEC turret mooring systems, SOFEC spread mooring systems, and SOFEC import/export terminals (CALM buoys).

TETRA Technologies Inc.,

The Woodlands, Tex., has named Stuart M. Brightman president and CEO effective May 5, 2009. He replaces Geoffrey M. Hertel. Brightman, who joined TETRA in 2005, currently is executive vice-president and COO. Hertel will remain on TETRA's board and as chairman of the board of Compressco.

TETRA is an oil and gas services company, including an integrated calcium chloride and brominated products manufacturing operation that supplies feedstocks to energy markets, as well as other markets.

T-3 Energy Services Inc.,

Houston, has appointed Steven W. Krablin president, CEO, and chairman. He replaces Gus D. Halas, who left the company to pursue other interests. Krablin rejoins T-3 Energy, where he served as a director from 2001 to 2004. From January 1996 until his retirement in April 2005, he was senior vice-president and CFO at National Oilwell Varco Inc. or its predecessors. Prior to 1996, Krablin served as senior vice-president and CFO of Enterra Corp. until its merger with Weatherford International Inc. He currently serves as a director of Penn Virginia Corp., Hornbeck Offshore Services Inc., and Chart Industries Inc.

T-3 Energy provides a broad range of oil field products and services primarily to customers in drilling and completion, workovers, and production and transportation of oil and gas.

Geoservices,


Poyet

Paris, has named Jean-Pierre Poyet executive vice-president and chief technology officer. He is also a member of the Geoservices executive committee. A graduate of Ecole Centrale, Poyet also has a PhD from Columbia University. He started his career as a researcher/astrophysicist in the University of Cambridge and later the French National Scientific Research Center. He joined Schlumberger in 1985, where he held various positions in engineering, research, operations, and marketing. He joined Geoservices in 2002.

Geoservices is an oil field service company offering mud logging, well intervention, and field surveillance.

New industry visualization tool

Time Chart, a new web visualization tool, expands the capabilities of the PetroTrek tool kit of web parts and services.

The new tool allows users running Microsoft Office SharePoint Server 2007 to access from a single location information on production, operational, and safety data and view relationships between past and current well events. By making more data easily available and putting information in context, Time Chart facilitates decision-making to help oil companies improve their operational performance, the firm notes.

With Time Chart technology, petroleum information workers are empowered with another level of data visualization, the firm says. As a web part, Time Chart connects multiple data sources through web services, whether the data are stored locally or in a database thousands of miles away. All data can be displayed together graphically to form a composite view of information over any period of time.

The web part solution, with its components that work together to enable developers to create web pages for users to more easily access information, provides the ability to efficiently visualize well events. Among these events are allocated production, annulus pressure, downtime, choke size, flowing and shut in pressures, reworks, recompletions, well treatments, preventive maintenance, flowline temperature, attributed losses, well tests, and production status.

The PetroTrek tool kit is a collection of configurable web parts and services specifically designed to meet the complex information needs of petroleum engineers, geoscientists, and other members of an asset team. In addition to the Time Chart, the tool kit contains web parts for production decline curves, well logs, field maps, well tests, directional surveys, graphs, and tabular views of data. PetroTrek tool kit web parts can be combined and configured to quickly build production dashboards, operations reports, and electronic well files.

The company says its PetroTrek tool kit web parts use Microsoft Silverlight technology to render a graphically rich, interactive user experience. Users can pan, zoom, and manipulate data as well as configure presentation elements from the web part. And because the web parts use AJAX to stream data between browser and server, users don't have to wait for pages to reload to see changes take effect.

Source: **Information Store Inc.,** 10777 Westheimer, Suite 250, Houston, TX 77042.

Imports of crude and products

	Districts 1–4		District 5		Total US		
	3–13 2009	3–6 2009	3–13 2009	3–6 2009	3–13 2009	3–6 2009	*3–14 2008
	1,000 b/d						
Total motor gasoline	1,149	1,228	0	29	1,149	1,257	901
Mo. gas. blending comp.	971	784	0	17	971	801	579
Distillate	103	302	0	0	103	302	294
Residual	231	404	34	98	265	502	418
Jet fuel–kerosine	52	24	103	23	155	47	298
Propane–propylene	367	169	47	36	414	205	259
Other	(126)	141	53	12	(73)	153	365
Total products	**2,747**	**3,052**	**237**	**215**	**2,984**	**3,267**	**3,114**
Total crude	**8,176**	**7,897**	**1,004**	**1,224**	**9,180**	**9,121**	**9,468**
Total imports	**10,923**	**10,949**	**1,241**	**1,439**	**12,164**	**12,388**	**12,582**

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

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

OIL&GAS JOURNAL online research center

OGJ crack spread

	*3–20–09	*3–21–08	Change	Change, %
	$/bbl			
SPOT PRICES				
Product value	54.37	118.95	–64.58	–54.3
Brent crude	46.62	105.09	–58.47	–55.6
Crack spread	7.75	13.87	–6.11	–44.1
FUTURES MARKET PRICES				
One month				
Product value	57.35	116.32	–58.97	–50.7
Light sweet crude	49.46	105.36	–55.90	–53.1
Crack spread	7.88	10.96	–3.08	–28.1
Six month				
Product value	59.94	114.07	–54.13	–47.5
Light sweet crude	54.59	101.05	–46.46	–46.0
Crack spread	5.35	13.02	–7.67	–58.9

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

Purvin & Gertz LNG netbacks—Mar. 20, 2009

Receiving terminal	Liquefaction plant					
	Algeria	Malaysia	Nigeria	Austr. NW Shelf	Qatar	Trinidad
	$/MMbtu					
Barcelona	9.70	7.77	8.96	7.68	8.30	8.88
Everett	3.69	2.14	3.40	2.26	2.41	3.92
Isle of Grain	3.22	1.51	2.73	1.43	1.94	2.75
Lake Charles	1.88	0.57	1.72	0.70	0.81	2.36
Sodegaura	4.60	6.48	4.86	6.23	5.64	3.69
Zeebrugge	6.72	3.69	5.82	3.53	4.55	5.92

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	13,569	55,796	36,406	9,423	52,301	13,389	2,189
PADD 2	84,518	53,970	22,749	7,845	34,796	1,343	12,979
PADD 3	181,047	71,090	40,636	12,684	40,282	16,808	20,501
PADD 4	14,551	6,444	2,472	587	3,555	255	[1]842
PADD 5	59,596	28,412	23,451	969	14,582	4,840	—
Mar. 13, 2009	**353,281**	**215,712**	**125,714**	**31,508**	**145,516**	**36,635**	**36,511**
Mar. 6, 2009	**351,339**	**212,517**	**122,149**	**41,564**	**145,404**	**38,132**	**37,745**
Mar. 14, 2008[2]	**311,759**	**232,520**	**115,317**	**39,373**	**113,490**	**37,939**	**27,314**

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

Refinery report—Mar. 13, 2009

District	REFINERY OPERATIONS		REFINERY OUTPUT				
	Gross inputs	Crude oil inputs	Total motor gasoline	Jet fuel, kerosine	Fuel oils		Propane–propylene
					Distillate	Residual	
	1,000 b/d						
PADD 1	1,195	1,217	2,078	68	355	121	47
PADD 2	3,070	3,061	2,102	154	890	41	194
PADD 3	7,124	6,979	2,835	712	2,235	155	576
PADD 4	533	528	298	25	156	7	[1]158
PADD 5	2,552	2,395	1,555	367	458	142	—
Mar. 13, 2009	**14,474**	**14,180**	**8,868**	**1,326**	**4,094**	**466**	**975**
Mar. 6, 2009	**14,575**	**14,116**	**8,539**	**1,368**	**4,243**	**582**	**980**
Mar. 14, 2008[2]	**14,619**	**14,427**	**8,678**	**1,383**	**3,811**	**631**	**1,035**
	17,621 Operable capacity		**82.1% utilization rate**				

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

OGJ GASOLINE PRICES

	Price ex tax 3-18-09	Pump price* 3-18-09	Pump price 3-19-08
	¢/gal		
(Approx. prices for self-service unleaded gasoline)			
Atlanta	149.7	196.2	327.7
Baltimore	152.3	194.2	317.6
Boston	150.3	192.2	312.8
Buffalo	137.3	198.2	334.9
Miami	143.5	195.1	340.7
Newark	154.5	187.1	298.8
New York	122.0	182.9	314.8
Norfolk	148.8	187.2	314.6
Philadelphia	150.5	201.2	320.8
Pittsburgh	160.2	210.9	319.1
Wash., DC	171.5	209.9	322.7
PAD I avg	149.2	195.9	320.4
Chicago	148.8	213.2	349.9
Cleveland	145.9	192.3	313.3
Des Moines	146.8	187.2	317.8
Detroit	135.3	194.7	315.9
Indianapolis	131.7	191.1	320.9
Kansas City	148.8	184.8	313.7
Louisville	148.7	189.6	335.6
Memphis	143.7	183.5	317.7
Milwaukee	139.8	191.1	313.9
Minn.-St. Paul	144.9	188.9	309.8
Oklahoma City	140.5	175.9	313.7
Omaha	144.9	190.2	319.9
St. Louis	144.0	180.0	305.1
Tulsa	141.4	176.8	305.3
Wichita	139.0	182.4	304.3
PAD II avg	142.9	188.1	317.1
Albuquerque	149.7	186.1	308.8
Birmingham	144.8	184.1	318.7
Dallas-Fort Worth	143.0	181.4	312.6
Houston	139.0	177.4	311.7
Little Rock	147.4	187.6	315.6
New Orleans	145.8	184.2	311.7
San Antonio	144.0	182.4	305.7
PAD III avg	144.8	183.3	312.1
Cheyenne	144.1	176.5	303.5
Denver	146.2	186.6	317.6
Salt Lake City	139.9	182.8	315.2
PAD IV avg	143.4	182.0	312.1
Los Angeles	150.0	217.1	346.5
Phoenix	164.8	202.2	301.7
Portland	183.4	226.8	341.4
San Diego	165.5	232.6	358.4
San Francisco	170.5	237.6	370.6
Seattle	171.0	226.9	350.4
PAD V avg	167.5	223.9	344.8
Week's avg.	**148.4**	**194.0**	**320.8**
Feb. avg.	**144.0**	**189.6**	**303.1**
Jan. avg.	**131.5**	**177.1**	**304.5**
2009 to date	**140.2**	**185.8**	—
2008 to date	**262.8**	**306.4**	—

*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

	3-13-09 ¢/gal		3-13-09 ¢/gal
Spot market product prices			
Motor gasoline (Conventional-regular)		Heating oil No. 2	
New York Harbor	125.26	New York Harbor	118.25
Gulf Coast	124.01	Gulf Coast	112.75
Los Angeles	130.76	Gas oil	
Amsterdam-Rotterdam-Antwerp (ARA)	108.35	ARA	120.97
Singapore	124.67	Singapore	111.90
Motor gasoline (Reformulated-regular)		Residual fuel oil	
New York Harbor	125.14	New York Harbor	83.64
Gulf Coast	124.01	Gulf Coast	86.02
Los Angeles	137.26	Los Angeles	113.07
		ARA	86.24
		Singapore	88.25

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

BAKER HUGHES RIG COUNT

	3-20-09	3-21-08
Alabama	2	5
Alaska	10	7
Arkansas	47	40
California	19	35
Land	19	34
Offshore	0	1
Colorado	56	117
Florida	0	0
Illinois	1	0
Indiana	2	2
Kansas	22	12
Kentucky	10	11
Louisiana	132	139
N. Land	73	46
S. Inland waters	5	17
S. Land	16	27
Offshore	38	49
Maryland	0	0
Michigan	0	1
Mississippi	11	13
Montana	2	10
Nebraska	0	0
New Mexico	39	73
New York	3	7
North Dakota	48	56
Ohio	7	12
Oklahoma	116	205
Pennsylvania	27	21
South Dakota	0	2
Texas	430	879
Offshore	4	7
Inland waters	1	2
Dist. 1	10	30
Dist. 2	19	39
Dist. 3	38	57
Dist. 4	40	84
Dist. 5	104	190
Dist. 6	82	125
Dist. 7B	10	35
Dist. 7C	15	53
Dist. 8	38	123
Dist. 8A	13	23
Dist. 9	20	35
Dist. 10	36	76
Utah	21	40
West Virginia	24	23
Wyoming	43	63
Others—NV-5; TN-3; VA-3; WA-2	13	11
Total US	**1,085**	**1,784**
Total Canada	**159**	**328**
Grand total	**1,244**	**2,112**
US Oil rigs	215	341
US Gas rigs	857	1,433
Total US offshore	43	57
Total US cum. avg. YTD	**1,623**	**1,767**

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

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

SMITH RIG COUNT

Proposed depth, ft	Rig count	3-20-09 Percent footage*	Rig count	3-21-08 Percent footage*
0-2,500	48	2.0	84	3.5
2,501-5,000	66	60.6	108	52.7
5,001-7,500	146	19.8	202	22.2
7,501-10,000	245	2.4	438	2.7
10,001-12,500	224	3.1	426	4.4
12,501-15,000	218	—	302	0.3
15,001-17,500	120	—	102	—
17,501-20,000	73	—	77	—
20,001-over	34	—	37	—
Total	**1,174**	**7.0**	**1,776**	**7.7**
INLAND	12		30	
LAND	1,114		1,691	
OFFSHORE	48		55	

*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]3-20-09	[2]3-21-08
	1,000 b/d	
(Crude oil and lease condensate)		
Alabama	22	21
Alaska	730	718
California	659	654
Colorado	65	66
Florida	7	6
Illinois	27	25
Kansas	107	106
Louisiana	1,449	1,278
Michigan	16	16
Mississippi	61	59
Montana	90	85
New Mexico	167	162
North Dakota	204	143
Oklahoma	179	171
Texas	1,375	1,336
Utah	59	55
Wyoming	149	147
All others	69	69
Total	**5,435**	**5,117**

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

US CRUDE PRICES

	3-20-09 $/bbl*
Alaska-North Slope 27°	35.34
South Louisiana Sweet	53.00
California-Kern River 13°	45.00
Lost Hills 30°	53.70
Wyoming Sweet	38.06
East Texas Sweet	47.00
West Texas Sour 34°	39.75
West Texas Intermediate	47.50
Oklahoma Sweet	47.50
Texas Upper Gulf Coast	40.50
Michigan Sour	39.50
Kansas Common	46.50
North Dakota Sweet	42.75

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

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

WORLD CRUDE PRICES

$/bbl[1]	3-13-09
United Kingdom-Brent 38°	44.04
Russia-Urals 32°	43.02
Saudi Light 34°	40.18
Dubai Fateh 32°	42.90
Algeria Saharan 44°	45.53
Nigeria-Bonny Light 37°	46.57
Indonesia-Minas 34°	46.17
Venezuela-Tia Juana Light 31°	44.46
Mexico-Isthmus 33°	44.35
OPEC basket	43.93
Total OPEC[2]	42.61
Total non-OPEC[2]	43.28
Total world[2]	42.91
US imports[3]	42.39

[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]

	3-13-09	3-6-09	3-13-08	Change, %
	bcf			
Producing region	698	690	493	**41.6**
Consuming region east	677	703	649	**4.3**
Consuming region west	276	288	183	**50.8**
Total US	**1,651**	**1,681**	**1,325**	**24.6**
	Dec. 08	**Dec. 07**	**Change, %**	
Total US[2]	**2,840**	**2,879**	**–1.4**	

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

Imports of crude and products

	Districts 1–4		District 5		Total US		
	3–20 2009	3–13 2009	3–20 2009	3–13 2009	3–20 2009	3–13 2009	*3–21 2008
	1,000 b/d						
Total motor gasoline	989	1,149	147	0	1,136	1,149	963
Mo. gas. blending comp.	788	971	12	0	800	971	610
Distillate	449	103	0	0	449	103	242
Residual	261	231	115	34	376	265	425
Jet fuel–kerosine	38	52	18	103	56	155	41
Propane–propylene	137	367	23	47	160	414	135
Other	126	(126)	108	53	234	(73)	820
Total products	**2,788**	**2,747**	**423**	**237**	**3,211**	**2,984**	**3,236**
Total crude	**8,186**	**8,176**	**1,198**	**1,004**	**9,384**	**9,180**	**8,898**
Total imports	**10,974**	**10,923**	**1,621**	**1,241**	**12,595**	**12,164**	**12,134**

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

Purvin & Gertz LNG netbacks—Mar. 27, 2009

Receiving terminal	Liquefaction plant					
	Algeria	Malaysia	Nigeria	Austr. NW Shelf	Qatar	Trinidad
	$/MMbtu					
Barcelona	9.70	6.28	8.95	6.19	8.29	8.88
Everett	3.63	1.99	3.33	2.10	2.43	3.86
Isle of Grain	3.98	2.26	3.49	2.17	2.70	3.51
Lake Charles	1.87	0.41	1.71	0.55	0.68	2.30
Sodegaura	4.17	6.47	4.43	6.23	5.64	3.68
Zeebrugge	6.30	3.47	5.35	3.37	4.08	5.44

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	13,577	55,907	36,626	9,673	53,042	12,646	2,782
PADD 2	85,705	51,469	22,223	7,586	34,261	1,304	13,197
PADD 3	184,568	72,177	41,100	12,335	39,347	15,579	20,991
PADD 4	14,729	6,401	2,502	589	3,418	266	[1]820
PADD 5	58,004	28,614	23,416	9,161	13,864	4,919	—
Mar. 20, 2009	**356,583**	**214,568**	**125,867**	**39,344**	**143,932**	**34,714**	**37,790**
Mar. 13, 2009	**353,281**	**215,712**	**125,714**	**31,508**	**145,516**	**36,635**	**37,104**
Mar. 21, 2008[2]	**311,847**	**229,235**	**114,582**	**38,006**	**111,349**	**38,638**	**25,412**

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

Refinery report—Mar. 20, 2009

District	Refinery operations		Refinery output				
	Gross inputs	Crude oil inputs	Total motor gasoline	Jet fuel, kerosine	Fuel oils		Propane–propylene
					Distillate	Residual	
	1,000 b/d						
PADD 1	1,036	1,057	2,036	76	263	110	41
PADD 2	2,852	2,843	2,112	195	824	44	198
PADD 3	7,338	7,107	2,809	724	1,994	252	631
PADD 4	520	518	277	23	151	10	[1]164
PADD 5	2,705	2,610	1,489	375	481	205	—
Mar. 20, 2009	**14,451**	**14,135**	**8,723**	**1,393**	**3,713**	**621**	**1,034**
Mar. 13, 2009	**14,474**	**14,180**	**8,868**	**1,326**	**4,094**	**466**	**975**
Mar. 21, 2008[2]	**14,326**	**14,135**	**8,539**	**1,362**	**3,858**	**643**	**1,011**
	17,621 Operable capacity		**82.0 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.

OIL&GAS JOURNAL online research center

OGJ crack spread

	*3–27–09	*3–28–08	Change	Change, %
	$/bbl			
SPOT PRICES				
Product value	59.74	117.07	–57.32	–49.0
Brent crude	51.50	103.99	–52.49	–50.5
Crack spread	8.24	13.08	–4.84	–37.0
FUTURES MARKET PRICES				
One month				
Product value	62.52	119.05	–56.53	–47.5
Light sweet crude	53.45	104.24	–50.79	–48.7
Crack spread	9.06	14.81	–5.75	–38.8
Six month				
Product value	65.28	115.02	–49.74	–43.2
Light sweet crude	59.40	101.28	–41.88	–41.4
Crack spread	5.89	13.75	–7.86	–57.2

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

OGJ GASOLINE PRICES

	Price ex tax 3-25-09	Pump price* 3-25-09	Pump price 3-26-08
	¢/gal		
(Approx. prices for self-service unleaded gasoline)			
Atlanta	148.8	195.3	327.2
Baltimore	151.4	193.3	317.1
Boston	149.4	191.3	312.2
Buffalo	136.4	197.3	334.2
Miami	142.7	194.3	340.2
Newark	153.7	186.3	298.2
New York	120.7	181.6	314.2
Norfolk	147.9	186.3	314.1
Philadelphia	149.6	200.3	320.5
Pittsburgh	159.5	210.2	318.7
Wash., DC	170.8	209.2	322.2
PAD I avg	148.3	195.1	319.9
Chicago	153.9	218.3	351.2
Cleveland	151.0	197.4	315.2
Des Moines	153.3	193.7	319.2
Detroit	140.1	199.5	317.2
Indianapolis	136.2	195.6	322.2
Kansas City	152.9	188.9	315.2
Louisville	152.9	193.8	334.5
Memphis	151.3	191.1	319.2
Milwaukee	145.7	197.0	315.2
Minn.-St. Paul	150.2	194.2	313.9
Oklahoma City	147.2	182.6	314.5
Omaha	150.0	195.3	321.6
St. Louis	149.3	185.3	307.0
Tulsa	146.8	182.2	306.4
Wichita	145.3	188.7	306.0
PAD II avg	148.4	193.6	318.6
Albuquerque	151.6	188.0	310.9
Birmingham	146.7	186.0	320.8
Dallas-Fort Worth	145.3	183.7	314.8
Houston	141.3	179.7	313.8
Little Rock	148.3	188.5	317.8
New Orleans	147.6	186.0	314.5
San Antonio	145.7	184.1	307.8
PAD III avg	146.6	185.1	314.4
Cheyenne	152.4	184.8	306.4
Denver	153.1	193.5	323.1
Salt Lake City	146.0	188.9	319.0
PAD IV avg	150.5	189.0	316.2
Los Angeles	142.5	209.6	350.8
Phoenix	157.3	194.7	307.8
Portland	176.1	219.5	345.7
San Diego	158.4	225.5	362.7
San Francisco	163.4	230.5	377.5
Seattle	163.7	219.6	354.1
PAD V avg	160.2	216.6	349.8
Week's avg.	**149.9**	**195.5**	**322.5**
Mar. avg.	**147.6**	**193.2**	**276.1**
Feb. avg.	**144.0**	**189.6**	**303.1**
2009 to date	**141.0**	**186.6**	—
2008 to date	**264.0**	**307.6**	—

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

REFINED PRODUCT PRICES

	3-20-09 ¢/gal		3-20-09 ¢/gal
Spot market product prices			
Motor gasoline (Conventional-regular)		Heating oil No. 2	
New York Harbor	131.70	New York Harbor	136.42
Gulf Coast	134.70	Gulf Coast	129.67
Los Angeles	149.08	Gas oil	
Amsterdam-Rotterdam-Antwerp (ARA)	126.06	ARA	138.57
Singapore	138.10	Singapore	134.29
Motor gasoline (Reformulated-regular)		Residual fuel oil	
New York Harbor	131.70	New York Harbor	94.57
Gulf Coast	142.45	Gulf Coast	93.76
Los Angeles	155.08	Los Angeles	108.36
		ARA	90.36
		Singapore	93.88

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

BAKER HUGHES RIG COUNT

	3-27-09	3-28-09
Alabama	2	5
Alaska	9	7
Arkansas	47	43
California	22	35
Land	21	34
Offshore	1	1
Colorado	55	123
Florida	0	0
Illinois	1	0
Indiana	1	2
Kansas	16	12
Kentucky	10	11
Louisiana	128	142
N. Land	70	49
S. Inland waters	6	13
S. Land	17	28
Offshore	35	52
Maryland	0	0
Michigan	0	1
Mississippi	11	14
Montana	1	12
Nebraska	0	0
New Mexico	38	70
New York	1	8
North Dakota	46	55
Ohio	7	12
Oklahoma	110	213
Pennsylvania	27	22
South Dakota	0	2
Texas	413	881
Offshore	4	7
Inland waters	1	2
Dist. 1	10	28
Dist. 2	16	40
Dist. 3	40	52
Dist. 4	40	89
Dist. 5	100	184
Dist. 6	75	122
Dist. 7B	9	35
Dist. 7C	15	66
Dist. 8	41	124
Dist. 8A	13	22
Dist. 9	17	36
Dist. 10	32	74
Utah	18	39
West Virginia	22	23
Wyoming	41	65
Others—NV-5; TN-3; VA-3; WA-2	13	11
Total US	**1,039**	**1,808**
Total Canada	**104**	**171**
Grand total	**1,143**	**1,979**
US Oil rigs	217	350
US Gas rigs	810	1,447
Total US offshore	41	60
Total US cum. avg. YTD	**1,623**	**1,770**

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

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

SMITH RIG COUNT

Proposed depth, ft	Rig count	3-27-09 Percent footage*	Rig count	3-28-08 Percent footage*
0-2,500	49	2.0	76	5.2
2,501-5,000	63	60.3	112	50.0
5,001-7,500	140	20.0	214	21.9
7,501-10,000	234	2.5	429	2.7
10,001-12,500	220	4.0	439	4.3
12,501-15,000	206	—	293	—
15,001-17,500	124	—	106	—
17,501-20,000	66	—	76	—
20,001-over	37	—	38	—
Total	**1,139**	**7.1**	**1,783**	**7.7**
INLAND	11		27	
LAND	1,080		1,698	
OFFSHORE	48		58	

*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]3-27-09	[2]3-28-08
	1,000 b/d	
(Crude oil and lease condensate)		
Alabama	21	20
Alaska	729	720
California	657	651
Colorado	64	65
Florida	6	6
Illinois	27	26
Kansas	107	106
Louisiana	1,444	1,283
Michigan	16	16
Mississippi	61	60
Montana	90	85
New Mexico	167	162
North Dakota	205	146
Oklahoma	177	171
Texas	1,370	1,337
Utah	59	55
Wyoming	150	148
All others	69	70
Total	**5,419**	**5,127**

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

US CRUDE PRICES

	3-27-09 $/bbl*
Alaska-North Slope 27°	35.34
South Louisiana Sweet	54.50
California-Kern River 13°	46.30
Lost Hills 30°	54.30
Wyoming Sweet	39.38
East Texas Sweet	48.25
West Texas Sour 34°	41.00
West Texas Intermediate	48.75
Oklahoma Sweet	48.75
Texas Upper Gulf Coast	41.75
Michigan Sour	40.75
Kansas Common	47.75
North Dakota Sweet	43.50

*Current major refiner's posted prices except North Slope lags 2 months. 40° gravity crude unless differing gravity is shown.
Source: Oil & Gas Journal.
Data available in OGJ Online Research Center.

WORLD CRUDE PRICES

$/bbl[1]	3-20-09
United Kingdom-Brent 38°	45.80
Russia-Urals 32°	43.96
Saudi Light 34°	42.88
Dubai Fateh 32°	44.51
Algeria Saharan 44°	47.27
Nigeria-Bonny Light 37°	47.94
Indonesia-Minas 34°	48.07
Venezuela-Tia Juana Light 31°	46.94
Mexico-Isthmus 33°	46.83
OPEC basket	45.91
Total OPEC[2]	44.81
Total non-OPEC[2]	45.01
Total world[2]	44.90
US imports[3]	44.51

[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]

	3-20-09	3-13-09	3-20-08	Change, %
	bcf			
Producing region	709	698	493	**43.8**
Consuming region east	664	677	612	**8.5**
Consuming region west	281	276	177	**58.8**
Total US	**1,654**	**1,651**	**1,282**	**29.0**
	Dec. 08	**Dec. 07**	**Change %**	
Total US[2]	**2,840**	**2,879**	**–1.4**	

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

PACE REFINING MARGINS

	Jan. 2008	Feb. 2009	Mar. 2009	Mar. 2008	Change	Change, %
			$/bbl			
US Gulf Coast						
West Texas Sour	10.07	9.41	3.35	12.82	–9.47	–73.9
Composite US Gulf Refinery	10.31	7.64	2.17	15.06	–12.90	–85.6
Arabian Light	12.66	9.39	–0.17	11.95	–12.11	–101.4
Bonny Light	2.91	0.55	0.21	6.21	–5.99	–96.6
US PADD II						
Chicago (WTI)	7.96	6.68	1.10	10.10	–9.00	–89.1
US East Coast						
NY Harbor (Arab Med)	17.17	14.82	2.65	8.24	–5.59	–67.8
East Coast Comp–RFG	11.88	11.33	6.52	8.29	–1.77	–21.3
US West Coast						
Los Angeles (ANS)	14.32	10.49	3.59	12.64	–9.05	–71.6
NW Europe						
Rotterdam (Brent)	4.30	3.79	0.33	1.88	–1.55	–82.5
Mediterranean						
Italy (Urals)	5.90	4.49	2.26	7.68	–5.42	–70.6
Far East						
Singapore (Dubai)	2.09	2.22	–1.06	7.27	–8.32	–114.5

Source: Jacobs Consultancy Inc.
Data available in OGJ Online Research Center.

US NATURAL GAS BALANCE DEMAND/SUPPLY SCOREBOARD

	Dec. 2008	Nov. 2008	Dec. 2007	Dec. 2008–2007 change	Total YTD 2008	Total YTD 2007	YTD 2008–2007 change
				bcf			
DEMAND							
Consumption	2,389	1,855	2,392	–3	23,253	23,047	206
Addition to storage	110	194	63	47	3,335	3,133	202
Exports	91	94	101	–10	980	822	158
Canada	61	64	72	–11	567	482	85
Mexico	26	26	25	1	363	292	71
LNG	4	4	4	0	50	48	2
Total demand	**2,590**	**2,143**	**2,556**	**34**	**27,568**	**27,002**	**566**
SUPPLY							
Production (dry gas)	1,797	1,730	1,688	109	20,571	19,089	1,482
Supplemental gas	6	5	4	2	55	63	–8
Storage withdrawal	615	251	632	–17	3,367	3,325	42
Imports	379	321	397	–18	3,976	4,608	–632
Canada	341	292	372	–31	3,581	3,783	–202
Mexico	7	6	4	3	43	54	–11
LNG	31	23	21	10	352	771	–419
Total supply	**2,797**	**2,307**	**2,721**	**76**	**27,969**	**27,085**	**884**

NATURAL GAS IN UNDERGROUND STORAGE

	Dec. 2008	Nov. 2008	Oct. 2008	Dec. 2007	Change
			bcf		
Base gas	4,229	4,231	4,235	4,234	–5
Working gas	2,840	3,346	3,399	2,879	–39
Total gas	**7,069**	**7,577**	**7,634**	**7,113**	**–44**

Source: DOE Monthly Energy Review.
Data available in OGJ Online Research Center.

WORLDWIDE NGL PRODUCTION

	Dec. 2008	Nov. 2008	12 month average production 2008	12 month average production 2007	Change vs. previous year Volume	Change vs. previous year %
			1,000 b/d			
Brazil	82	84	86	85	2	1.9
Canada	550	624	631	689	–58	–8.5
Mexico	364	349	365	396	–30	–7.7
United States	1,604	1,734	1,781	1,776	5	0.3
Venezuela	200	200	200	200	—	—
Other Western Hemisphere	200	198	197	203	–6	–3.0
Western Hemisphere	**3,000**	**3,189**	**3,260**	**3,348**	**–88**	**–2.6**
Norway	273	286	275	285	–10	–3.6
United Kingdom	164	162	164	146	18	12.4
Other Western Europe	10	9	10	10	–1	–5.4
Western Europe	**447**	**457**	**448**	**441**	**7**	**1.7**
Russia	420	421	422	426	–4	–1.0
Other FSU	150	150	150	160	–10	–6.3
Other Eastern Europe	16	15	15	15	1	3.6
Eastern Europe	**586**	**586**	**587**	**601**	**–14**	**–2.3**
Algeria	350	365	357	342	15	4.4
Egypt	70	70	70	70	—	—
Libya	80	80	80	80	—	—
Other Africa	120	120	127	127	—	—
Africa	**620**	**635**	**634**	**619**	**15**	**2.4**
Saudi Arabia	1,353	1,453	1,434	1,440	–6	–0.4
United Arab Emirates	250	250	250	250	—	—
Other Middle East	835	835	869	870	–2	–0.2
Middle East	**2,589**	**2,576**	**2,572**	**2,560**	**12**	**0.5**
Australia	62	64	66	74	–8	–10.8
China	650	650	635	615	20	3.3
India	—	—	—	3	–3	–100.0
Other Asia–Pacific	173	172	177	176	1	0.5
Asia–Pacific	**884**	**886**	**878**	**868**	**10**	**1.2**
TOTAL WORLD	**7,975**	**8,291**	**8,359**	**8,436**	**–77**	**–0.9**

Totals may not add due to rounding.
Source: Oil & Gas Journal.
Data available in OGJ Online Research Center.

OXYGENATES

	Dec. 2008	Nov. 2008	Change	YTD 2008	YTD 2007	Change
			1,000 bbl			
Fuel ethanol						
Production	20,342	20,054	288	219,927	154,416	65,511
Stocks	14,219	15,227	–1008	14,219	10,509	3,710
MTBE						
Production	1,263	1,236	27	17,319	22,847	–5,528
Stocks	1,455	649	806	1,455	1,015	440

Source: DOE Petroleum Supply Monthly.
Data available in OGJ Online Research Center.

US HEATING DEGREE–DAYS

	Feb. 2009	Feb. 2008	Normal	2009 % change from normal	Total degree–days July 1 through Feb. 28 2009	Total degree–days July 1 through Feb. 28 2008	Total degree–days July 1 through Feb. 28 Normal	% change from normal
New England	1,029	1,019	1,060	–2.9	4,927	4,523	4,768	3.3
Middle Atlantic	931	940	983	–5.3	4,390	3,905	4,332	1.3
East North Central	1,021	1,153	1,061	–3.8	5,062	4,630	4,835	4.7
West North Central	1,028	1,225	1,078	–4.6	5,246	5,123	5,163	1.6
South Atlantic	503	439	507	–0.8	2,277	1,943	2,233	2.0
East South Central	586	586	523	12.0	2,858	2,577	2,853	0.2
West South Central	297	362	414	–28.3	1,711	1,727	1,912	–10.5
Mountain	699	770	737	–5.2	3,467	3,708	3,835	–9.6
Pacific	480	474	439	9.3	2,051	2,322	2,256	–9.1
US average*	**701**	**736**	**732**	**–4.2**	**3,377**	**3,190**	**3,388**	**–0.3**

*Excludes Alaska and Hawaii.
Source: DOE Monthly Energy Review.
Data available in OGJ Online Research Center.

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Salazar: It's not war on oil and gas; it's taxation

The Editor's Perspective

by Bob Tippee, Editor

In case anyone finds the difference between war and larceny puzzling, US Interior Sec. Ken Salazar offers help.

"This is not, as some have suggested, a war on the oil and gas industry," Salazar assured directors of the American Petroleum Institute Mar. 19.

"This," according to the secretary's analysis in a prepared text, is President Barack Obama's program of change: "Restoring honesty and fiscal responsibility to the budget. Making hard choices. Seeing where we can get a better deal for the American taxpayer."

Troubling words, these.

According to Salazar, "Interior has not systematically reexamined how the federal government is compensated for extraction of oil and gas for over 25 years."

So it must have tumbled by accident into its January 2007 increase in the royalty on deepwater leases to 16.67% from 12.5%. But who's to quibble?

"We are going to take another look at royalty rates," said the cabinet officer who, since taking office, has been busily trimming producer access to federal land, onshore and off.

"Tax breaks that are no longer needed, and which the American people can't afford, will disappear," he went on.

This, of course, already is clear in a proposed federal budget that would, if enacted, use the tax code to ravage investment in onshore drilling and impose a new offshore excise.

Two days before Salazar spread his cheer in the API boardroom, Mary L. Kendall, Interior's acting inspector general, spoke at a congressional subcommittee hearing of the insufficiency of pressure on federal offshore leaseholders to produce oil and gas.

"Production activities are not required to commence within the primary lease term," she said, keeping alive the "use-it-or-lose-it" issue that reared its ludicrous head last year (OGJ Online, Mar. 18, 2009).

There is, in fact, no reason for leases to stipulate production. The money and trouble invested in offshore leases constitute all the incentive leaseholders need to produce oil and gas.

Alas, the Obama team evidently distrusts market incentives and sees no contraction in policy inducements to rush oil and gas production from a static lease inventory for less money.

But, hey, it's not war.

(Online Mar. 20, 2009: author's e-mail: bobt@ogjonline.com)

Market Journal

by Sam Fletcher, Senior Writer

Economic outlook remains cloudy

In the final days of March, market analysts saw some indications that the economic crisis might be nearing bottom and could perhaps rebound in the second half of this year.

The Commerce Department reported that consumer spending increased by 0.2% in February. Analysts at Pritchard Capital Partners LLC, New Orleans, noted Mar. 20 that crude prices had gained more than $20/bbl, or 59%, from earlier lows of $33.98/bbl, while Department of Energy data for 2 of the previous 3 weeks showed increased US demand from 2008 levels. The average US retail price for conventional gasoline climbed to $2/gal for the first time since November.

Still, Adam Sieminski, chief energy economist, Deutsche Bank, Washington, DC, said, "The global economy is in worse shape than the consensus expects, but… the world can avert a 1930s style downturn. We expect the energy and industrial metals complex eventually will be the major beneficiaries of an improving economic outlook."

In its Mar. 30 weekly report, the Centre for Global Energy Studies (CGES) said Mideast Gulf liftings are at a 6-year low, averaging 16.4 million b/d in March, down more than 1.5 million b/d from last year's high. Most of that falloff has occurred since December, but the long lead-time between oil being lifted in the Middle East and arriving off the coasts of consumer countries means the full impact of production reductions has yet to be felt in North America and Europe.

However, CGES analysts see "little clear evidence" that producers have been turning customers away. Oil supplies still in floating storage "suggests producers have cut production in response to falling demand from refiners," they said. Although the Organization of Petroleum Exporting Countries remains committed to the lower production quotas agreed in December, CGES analysts said, "It is unlikely that Mideast Gulf liftings will fall much further, as the Gulf Arab states are already near full compliance, while Iran is unlikely to cut its output much further."

Inventories rising

Meanwhile, inventories of crude and petroleum products continued rising this year in the US, EU16, and Japan but remain below the levels of 2006-07. Increased domestic production has increased US crude stocks despite a drop in imports. "Crude oil stocks in Europe and Japan fell by 7 million bbl in January and February and are down by a further 10 million bbl in Japan, where the economy is shrinking at a rate not seen since the 1970s," CGES said. Imports will fall further as OPEC reductions progress down the supply chain.

"Refined product stocks have risen as demand has weakened, but this is easing as refiners cut runs in response to weak margins. If weak margins persist and throughput continues to be low, any upturn in demand could see refined product stocks begin to fall from current highs," CGES reported.

Global refining runs historically decline from January through April or May, as refiners in the US and Europe do seasonal maintenance in preparation for the summer months, when demand for gasoline is dominant. But this year, CGES said, January throughputs in major refining centers were down more than 2.5 million b/d (5%) from a year ago because of poor profit margins due to the sharp falloff in demand.

"Even a 700,000 b/d increase in February, primarily in Europe, leaves runs 1.7 million b/d (3%) down on the same month last year. It seems unlikely that this upward trend will continue, with major refiners in the US and Asia announcing extended maintenance closures and run cuts in the second quarter," said CGES analysts.

Meanwhile a sharp drop in middle distillate margins in major refining centers suggests that demand for diesel, a key indicator of economic activity, is shrinking globally. Gas oil stocks in Singapore are climbing due to increased exports from China, South Korea, and Japan. "Chinese state refiners will be allowed to export 680,000 tonnes of diesel tax-free in the second quarter to help reduce Chinese stocks," CGES reported. "Independent gas oil stocks in Rotterdam have risen to around 17 million bbl as supplies from Russia increase and European demand for heating fuels drops. US distillate stock levels fell in the week ending Mar. 20 . . . but are still well above the 5-year average. Until economic activity picks up, or refinery throughputs fall even further, margins will remain weak."

Jacques H. Rousseau, an analyst at Soleil-Back Bay Research, reduced his estimates of 2009 earnings at six refining companies primarily due to the sharp decline in refining margins in March and the potential for increased gasoline imports during this year's second quarter.

(Online Mar. 30, 2009; author's e-mail: samf@ogjonline.com)

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The Oil Sands and Heavy Oil Technologies Conference attracts a senior level audience from across the spectrum of oil sands professionals. Industry professionals expected to attend include:

- Engineers and managers who work on oil sands and heavy oil development projects
- Field supervisors who must understand the complexities and parameters of oil sands and heavy oil production, processing, and transportation
- Operations planning personnel involved in planning and scheduling oil sands and heavy oil development projects worldwide
- Engineering staff and management involved in oil sands and heavy oil development decision-making
- Suppliers of equipment or services for oil sands and heavy oil development, processing, or transportation
- Consulting companies that advise clients on current industry standards or oil sands and heavy oil development trends
- Business development managers pursuing oil sands and heavy oil business opportunities
- Companies that provide cogeneration equipment and/or combustion turbine equipment
- Independent electricity generators interested in oil sands cogeneration opportunities
- Transmission companies interested in oil sands and Alberta electricity markets

EVENT OVERVIEW

- A gathering of the world's leading executives, managers, and engineers from a variety of energy, environmental, and engineering companies
- Original reports on the current and future state of technology and environmental remediation in this frontier environment delivered by key personnel involved in groundbreaking projects
- A renewed focus on oil sands technology and equipment, viewed at the strategic level with case studies and reports on application technologies
- Geopolitical and economic evaluations of the future of oil sands and heavy oil around the globe with input from major, independent, and state owned operators

TECHNICAL FOCUS AREAS

- In Situ and SAGD Operations
- Reservoir Characteristics and Fluid Properties
- Steam Injection
- Completion Technology, Strategies, and Techniques
- Modular Construction
- Water Management
- Pipeline Development
- Refinery Expansion and Modification
- Toe-to-Heel Air Injection
- Alternate Fuels
- Innovative Technology/ Technological Challenges
- Coke Gasification
- Extraction and Upgrading
- Elements of Surface Mining
- Technological Competencies – Research and Innovation
- Project Management and Planning
- Environmental, Health and Safety Stewardship
- Reliable and Cost Efficient Operations
- Regulatory Environment
- Marketing and Transportation
- Accounting and Legal Parameters
- Engineering Design
- Combined Heat and Power/ Cogeneration Technologies
- Economic Benefits of Cogeneration
- Sizing Cogeneration Facilities
- Cogeneration vs. Stand-Alone Electricity and Steam Production
- Transmissions Issues/Initiatives
- Remedial Action Scheme (RAS)
- Alberta Electricity Capacity and Market
- Combustion Turbine Technologies
- Sulfur Management
- Nuclear Power
- Byproduct Management
- Construction Optimization
- Emission Clean-up
- CO_2 Management
- Upgrading

SCHEDULE OF EVENTS

MONDAY, JULY 13, 2009

12:00 p.m. – 6:00 p.m.	Registration Open; Exhibit Hall Foyer
1:00 p.m. – 6:00 p.m.	Exhibitor Move-In; Exhibit Hall

TUESDAY, JULY 14, 2009

7:00 a.m. – 6:00 p.m.	Registration Open; Exhibit Hall Foyer
8:00 a.m. – 3:00 p.m.	Exhibitor Move-In; Exhibit Hall
8:00 a.m. – 12:30 p.m.	Workshop; Lower Level TELUS 105 *(additional registration required)*
12:30 p.m. – 1:30 p.m.	Workshop Q&A and Lunch
3:00 p.m. – 5:00 p.m.	Keynote Session; Hall E
5:00 p.m. – 6:00 p.m.	Networking Reception; Exhibit Hall
5:00 p.m. – 6:00 p.m.	Exhibit Hall Open

WEDNESDAY, JULY 15, 2009

7:30 a.m. – 5:30 p.m.	Registration Open; Exhibit Hall Foyer
8:00 a.m. – 8:30 a.m.	Networking Breakfast, Exhibit Hall Foyer
8:30 a.m. – 10:00 p.m.	Conference Session 1; Lower Level Meeting Rooms
10:00 a.m. – 6:15 p.m.	Exhibit Hall Open
10:00 a.m. – 10:45 a.m.	Coffee Break; Exhibit Hall
10:45 a.m. – 11:45 a.m.	Conference Session 2; Lower Level Meeting Rooms
12:00 p.m. – 1:30 p.m.	Lunch; Back of Exhibit Hall
1:30 p.m. – 3:00 p.m.	Conference Session 3; Lower Level Meeting Rooms
3:00 p.m. – 3:45 p.m.	Coffee Break; Exhibit Hall
3:45 p.m. – 5:15 p.m.	Conference Session 4; Lower Level Meeting Rooms
5:15 p.m. – 6:15 p.m.	Networking Reception; Exhibit Hall

THURSDAY, JULY 16, 2009

7:30 a.m. – 1:00 p.m.	Registration Open; Exhibit Hall Foyer
8:00 a.m. – 8:30 a.m.	Continental Breakfast, Exhibit Hall Foyer
8:30 a.m. – 10:00 a.m.	Conference Session 5; Lower Level Meeting Rooms
10:00 a.m. – 1:00 p.m.	Exhibit Hall Open
10:00 a.m. – 10:30 a.m.	Coffee Break; Exhibit Hall
10:30 a.m. – 12:00 p.m.	Conference Session 6; Lower Level Meeting Rooms
12:00 p.m. – 1:00 p.m.	Lunch; Exhibit Hall
1:00 p.m. – 2:30 p.m.	Closing Plenary Session
1:30 p.m. – 8:00 p.m.	Exhibitor Move-Out; Exhibit Hall

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INVESTMENT

Exhibit rates are US$42.00 per square foot (min. 10 ft. x 10 ft. of exhibit space). Space includes one full conference registration and two booth staff personnel passes.

This rate includes an obligatory presence in the enhanced Oil Sands and Heavy Oil Technologies 2009 online show catalogue and customer management system which will be charged at the flat rate of US$275 per exhibitor. Included in this basic listing is a powerful interactive online directory.

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Results of the 2008 on-site survey confirm Oil Sands and Heavy Oil Technologies as a leading industry event. Results are from those polled.

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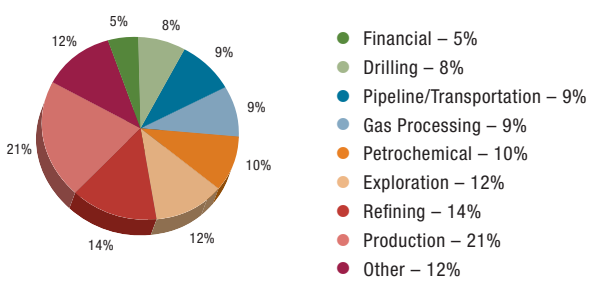

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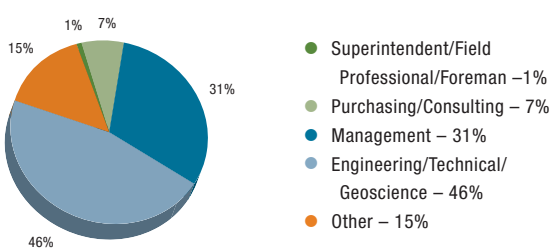

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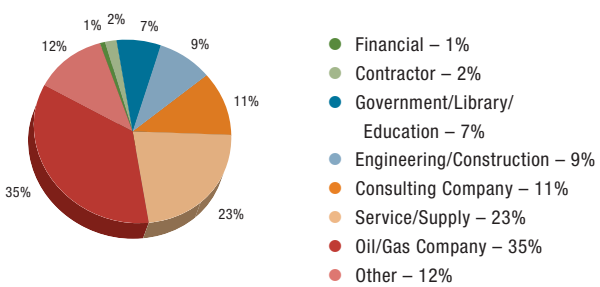

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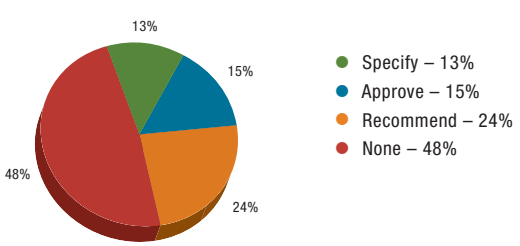

AN INTRODUCTION TO OIL SANDS & HEAVY OIL INDUSTRY, TECHNOLOGY & ECONOMICS

This workshop is an in depth introduction to the Oil Sands industry. It covers key areas of bitumen recovery and processing to transportation fuels. Then we review the industry economics, more urgent an issue in the recent economic downturn. On the environmental side, we'll compare some of the passionate myths with reality: what has the industry done since the 1970s, and what are they doing now?

Date: July 14, 2009 | Time: 8:00 a.m. – 1:00 p.m. | Instructor: Len Flint, LENEF Consulting (1994) Limited

Registration Fee: USD495

ABOUT THE INSTRUCTOR

Dr. Len Flint is President and Principal Consultant of LENEF Consulting (1994) Limited, Calgary, with experience in a wide range of oil sands projects, from the design of operating units to high-level research and development. Before founding his consultancy, Dr. Flint worked for 25 years with Shell Canada Limited.

He holds a B.Sc., D.I.C., and PhD in chemical engineering from the University of London, England.

COURSE OUTLINE

7:00 – 8:00 a.m. Registration & Continental Breakfast

8:00 – 10:00 a.m. Sessions 1 – 5

- **Introductory Remarks & Summary of Session**
  - What to cover
  - Terminology - "HC-101"
- **What is Bitumen?**
  - Quality versus Conventional Crudes
  - Quick History of Development Landmarks
  - Production Projections
  - Markets
- **Bitumen Recovery**
  - Mining
  - Thermal "in situ"
  - Recovery Costs
  - Alternatives to Natural Gas Use
  - New Technologies being Piloted
- **Why Upgrade?**
  - Field Upgrading: Moving to Markets
  - Synthetic Crude – Past and Future
- **Upgrading**
  - Original Coker-based Upgraders
  - Natural Gas Use and Impact
  - New Approaches to Upgrading
  - Hydrogen Management
  - By-products

10:00 – 10:30 a.m. Coffee Break

10:30 – 12:30 p.m. Sessions 6 - 9

- **Oil Sands Industry Economics**
  - Reminder of the Markets
  - Recovery & Upgrading – Project Economics
  - The Impact of New Royalty Proposals
  - Government and Industry: Who Gets What?
  - Key Drivers to Reduce Costs
- **Where to Upgrade**
  - Changing Costs in Alberta
  - Greenfield Costs versus Expansions
  - Canada versus U.S. Refineries
  - Current Plans
  - Are There Conclusions We Can Draw?
- **Environmental Challenges**
  - Oil Sands and the Environmental Groups
    How does the industry compare with other energy sources, and how are we meeting the challenges in key areas:
  - The Carbon footprint
  - Water
  - Mining -based tailings and Land Management
- **Summary**
  - Overview of Key Points in each Section

12:30 – 1:30 p.m. Q&A and Lunch

2009 CONFERENCE PROGRAM DETAIL

TUESDAY, JULY 14, 2009

3:00 p.m. – 5:00 p.m.	KEYNOTE SESSION Robert J. Mason, CA, CFA – Managing Director, Head of Oil Sands, Investment Banking Global Energy & Power Group, *TD Securities Inc.* The Honorable Mel Knight – *Minister of Energy – Alberta (Invited)* Clement W. Bowman – Chairman of the Board, *ProGrid Ventures Inc.* Founding Chairman, Alberta Oil Sands Technology and Research Authority
5:00 p.m. – 6:00 p.m.	**EXHIBIT HALL NETWORKING RECEPTION**

WEDNESDAY, JULY 15, 2009

8:00 a.m. - 8:30 a.m. **NETWORKING BREAKFAST**

SESSION 1 8:30 a.m. – 10:00 a.m.

TRACK 1: OPERATIONS MANAGEMENT Sponsored by: BAKER HUGHES

Mass and Heat Balance Approach for Oil Sand Flowsheets
Ahmed Salama – *Natural Resources Canada*
The paper presents an approach for oil sands flowsheet mass and heat balance where different objective functions are presented depending on the nature of the stream error distributions.

Think Modules! Big, Little, Small
Harold Burnham – *Advisory Energy Consulting, Inc.*
Modularization is the key to plug and play design concepts, rescuing project schedules, budgets and revenue generation.

De-risk Projects and Plant Operations with an Information System for Management Of Change (MOC)
Clive Wilby – *AVEVA*
The presentation overviews examples of the consequences of poor 'management of change' to both Engineering Contractors and Plant Owner Operators and discusses the important characteristics of an information management system to mitigate risk throughout a facilities lifecycle.

TRACK 2: IN SITU

Comparative Economic Analysis of Heavy Oil Extraction Methods
Motunlola Ajagbonna – *Robert Gordon University*
This paper presents a methodology to evaluate heavy oil projects to determine the optimum extraction method.

Oil Sands SAGD Performance Forecasting: A Life-Cycle Approach to Managing the Risks and Challenges Involved
Muhammad Bashir – *DNV*
Performance forecasting and risk evaluations for SAGD operations in oil sands.

Importance of Accurate Viscosity Prediction on Oil Sands Operations
Harpreet Gulati – *IPS SimSci-Esscor*
Discuss new Viscosity prediction method for Heavy Oils and the impact on design and operations.

TRACK 3: SULPHUR & OTHER PRODUCTS

MARKETING & LOGISTICS

Sulphur Markets in 2008 – What Happened?
Gerard d'Aquin – *Consul, Inc.*

US Phosphate Fertilizer Outlet and It's Impact on Canadian Oil Sands Sulphur
Karen Chasez – *Potash Corporation of Saskatchewan*

Paper - TBD

TRACK 4: HEAT, POWER & FUELS

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Oil to Power – An Alternative Marketing Concept
Simon Richards – *EPConsult, Ltd.*
How to get more bucks for a barrel.

Alstom's CFB Plant: Steam for the Oil Sands Industry from Alternative Fuels
Christian Bohtz – *Alstom*
A power plant concept for the Oil Sand Industry is presented, based on CFB technology, providing steam and optionally power, utilizing alternative fuels and taking specific requirements into account (CCS ready design).

Energy Recovery Systems for Meeting Steam and Power Demands of the Alberta Oil Sands Market
Rick Fiorenza – *CB-Natcom* and Greg Kaup – *C-B Energy Recovery (USA)*
This paper discusses recent innovations in the mid-size HRSG market to address the opportunities and challenges of the Oil Sands industry.

10:00 a.m. – 10:45 a.m. COFFEE BREAK

SESSION 2 10:45 a.m. – 11:45 a.m.

TRACK 1: OPERATIONS MANAGEMENT

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Achieving High Performance in Capital Projects Management
Dana Hanson – *Accenture*
Project management methods must continue to evolve in order to address project risk, capital expenditures predictability, volatility and capital efficiency.

Getting the Most Out of Your Capital Investment with Operational Readiness
Dr. Mike McGee – *Fluor*
The speaker will introduce a methodology to manage the integration of all the aspects of successfully bringing a new capital project to full production including the activities to adequately address capacity planning; life cycle design; and maintenance, operations, organizational, systems, support functions, supply chain readiness including the identification and mitigation of the associated risk.

TRACK 2: IN SITU

Metal PCP – From Prototype to Valuable Artificial Lift Mean
Laurent Seince – *PCM*
The metal progressive cavity pump, once a prototype, is now a reliable artificial lift system used for SAGD and CSS applications.

Debris Removal using Wireline Technology
Jeremy Ray – *Welltec Canada*
A case study presentation utilizing a wireline device to remove sand from SAGD wellbores.

SESSION 2 continues…

TRACK 3: SULPHUR & OTHER PRODUCTS

LOGISTICS

Rail Logistics and Challenges
Randy Meyer – *CN Rail*

Integrated Sulphur Management – Gas, Oil Sands, Reclamation and the Challenges of Fluctuating Demand
Don Roberts – *ICEC Canada*

TRACK 4: HEAT, POWER & FUELS

Sponsored by: ConocoPhillips Canada

Boiler and Environmental Equipment Design Considerations / Operating Experience related to the Combustion of Residual Fuels
Malcolm MacKenzie – *Babcock & Wilcox Canada*
This paper reviews the use of alternative fuels and related design requirements for combustion, boiler design and environmental equipment in order to meet present and future emissions limits.

O&M Considerations for Refinery Energy Islands
Mark Ehrnschwender – *Evonik Energy Systems LLC*
This paper will discuss the O&M considerations that need to be incorporated in the design / technology selection for the co-generation facility, as well as the balance between capital cost and O&M considerations.

12:00 p.m. – 1:30 p.m. LUNCH

SESSION 3 1:30 p.m. – 3:00 p.m.

TRACK 1: OPERATIONS MANAGEMENT

Sponsored by: BAKER HUGHES

Framing a Business Case for Sustainability
Frederico Allevato – *DNV*
Proactive management of environmental resources can be achieved through estimation of environmental risks and opportunities using a combination of operations knowledge, ecosystems knowledge, and a systematic approach.

Understanding US Oil Shale Development: The Canadian Analogy
Khosrow Biglarbigi – *INTEK, Inc.*
This paper describes the development of the Canadian oil sands industry and its lessons as they apply to the development of a framework for a United States oil shale industry.

Experience is On the Away: The Role of Advanced Equipment Simulation in Training a New Generation of Equipment Operators
Cory Cook – *Immersive Technologies*
This paper discusses simulation's role in helping to mitigate the risks of inexperience; helping companies train their workforce faster and more effectively to manage costs, increase productivity and create safer environments in the field.

TRACK 2: IN SITU

Systems Approach to Thermal Asset Monitoring using Advanced Distributed Temperature Sensing (DTS) Technology
Mikko Jaaskelainen – *SensorTran*
Emulsified bitumen could be used as fuel of choice for SAGD process, electrical and thermal needs.

Analysis of H_2S, CO_2 and Light Hydrocarbons from Thermally Treated Extra Heavy Oil Under Aquathermolysis Conditions using the MSSV Technique
Trygve Meyer – *StatoilHydro ASA*
The MSSV technology offers a cost effective screening of the generated amounts of H_2S and CO_2 during thermally treating of bitumen under aquathermolysis conditions.

Paper - TBD

TRACK 3: SULPHUR & OTHER PRODUCTS

ENVIRONMENTAL & TECHNICAL CONSIDERATIONS

A New Technology Aimed at Reestablishing a Global Sulfur Supply/Demand Balance
Angela Slavens – *Black & Veatch Energy*
This paper explores a new technology (STEP) that is currently under development, which is aimed at helping to dispose of excess sulfur while also affording the benefits of energy production and in-situ reservoir sweetening.

The Industrial Heartland Initiative Cumulative Effects Project - Sulphur Update
Speaker TBD – *Alberta Environment*

Paper - TBD

TRACK 4: HEAT, POWER & FUELS

Sponsored by: ConocoPhillips Canada

Steam Conversion of Heavy Oil Residues to Methane
Nicholas Nahas – *Petro2020, LLC*
This paper describes a process for conversion of heavy petroleum residues to methane by a potassium catalyzed reaction with steam.

Integrated Coking and Gasification to Address Today's Refining Challenges
Robert Carpenter – *GE Energy*
As the world supply of crude is getting heavier and sour, refiners face a difficult balance: process the cheaper crudes to realize economic benefits, and satisfy the progressively stringent environmental regulations for transportation fuels. Refiners can achieve this balance by integrating coking with gasification, and thereby meet the increasing demand for hydrogen to produce low sulfur fuels.

Siemens Fuel Gasification Technology for the Canadian Oil Sands Industry
Harry Morehead – *Siemens Energy, Inc.*
Siemens Gasification Project and Technology update with an Oil Sands application focus.

3:00 p.m. – 3:45 p.m. **COFFEE BREAK**

2009 CONFERENCE PROGRAM DETAIL

SESSION 4 3:45 p.m. – 5:15 p.m.

TRACK 1: UPGRADING

Advanced Upgrading Technologies: Location and CO_2 Capture Implications
Duke du Plessis – *Alberta Energy Research Institute*
Evaluation of advanced bitumen upgrading technologies and the CO_2 capture potential for integrated and non-integrated production and upgrading operations.

Aromatic Ring Saturation, Opening and Cleavage Technology for Middle Distillates
Dr. Michael Oballa – *NOVA Chemicals Corp.*
This paper highlights a process technology that converts conjugated aromatic compounds in heavy oils into light paraffins which are useful as feed to steam crackers.

Co-processing of Biooils from Biomass Pyrolysis and Bitumen from Oil Sands
Maoqi Feng – *Southwest Research Institute*
Co-processing of biooils and bitumen blend facilitates the cracking of heavy oils, however, the catalyst deactivation by hydrodeoxygenation of the biooils needs to be addressed.

TRACK 2: IN SITU

Method for Improving Steam Distribution during SAGD Operations
Dr. Roger Schultz – *Halliburton*
This paper describes a new pressure and temperature responsive valve which eliminates live steam production in thermal EOR operations.

Electromagnetic Heating Improves Steam Assisted Gravity Drainage
Michael Koolman – *Siemens AG*
Electromagnetic heating (EM_SAGD) proves to be the technology of choice to further improve SAGD-processes applied to various reservoir conditions.

Paper - TBD

TRACK 3: SULPHUR

Cutting Edge SRU Controls Improved Environmental Compliance with Jacobs Advanced Burner Control+ (ABC+)
Gerton Molenaar – *Jacobs Canada*
Revolutionary new SRU control increases sulfur recovery efficiency and eliminates plant upsets and SO_2 emission violations.

Separations Technologies to Improve Amine System Reliability: A Case Study
Hanif Lakhani or Anabel Raymond – *Pall Canada Ltd.*

Non-Thermal Plasma Treatment of Hydrogen Sulfide
Lyman Frost – *Ceramatec, Inc.*
The paper will discuss use of non-thermal plasma to break hydrogen sulfide into hydrogen and elemental sulfur.

TRACK 4: HEAT, POWER & FUELS Sponsored by: ConocoPhillips Canada

Emulsified Bitumen as Fuel for SAGD Process
Dennis Finn – *Wartsila North America, Inc.*
Emulsified bitumen could be used as fuel of choice for SAGD Process electrical and thermal needs.

Investigating the Life Cycle Impacts of Replacing Natural Gas in Oil Sands Operations
Jennifer McKellar – *University of Toronto*
To identify the most promising replacements for natural gas among a select group of alternative fuels by examining some of the key trade-offs between the different energy and hydrogen supply systems investigated.

Analysis of the Economics of Applying Small Modular Nuclear Reactors
Dr. John O'Brien – *Shale & Sands Oil Recovery LLC*
How small modular nuclear reactors can affect the economics and environmental impact in oil sands production.

5:15 p.m. – 6:15 p.m. **EXHIBIT HALL NETWORKING RECEPTION**

THURSDAY, JULY 16, 2009

8:00 a.m. - 8:30 a.m. **NETWORKING BREAKFAST**

SESSION 5 **8:30 a.m. – 10:00 a.m.**

TRACK 1: UPGRADING

Conceptual Design of Mobile or Stationary Activated Carbon Bed for Capturing Blowdown Hydrocarbons from High Pressure Facilities
Kamal Botros – *NOVA Chemicals*
A conceptual system design based on either a mobile system mounted on a trailer consisting or a stationary system that could be located in the midst of a complex refinery or upgrading facility to capture blowdown hydrocarbons from different parts of the complex. Performance of such systems has been evaluated numerically, and important design parameters are specified and quantified in terms of ranges and thresholds. The paper presents the results of this evaluation and points to future work which will be undertaken to complete a full feasibility analysis and detailed design features of the system.

Dehydration and Desalting of Heavy Crude Maya into TMDB by means of Tanks of Storage of 500 MB Converted to Gun Barrel
Luis Fernando Lopez Cisneros – *PEMEX*
In this work design a system of dehydration and desalting for 750 MBD of heavy crude Maya, by means tanks type Gun-Barrel. The design one carries out using the simulation packages HYSYS and CFD of ANSYS, considering the parameters that were studied in bottle tests and profiled in tanks of storage of 500 MB, being based in the settling speed that affects the dehydration and desalting of crude.

Paper TBD

2009 CONFERENCE PROGRAM DETAIL

SESSION 5 continues…

TRACK 2: IN SITU

Estimation of Heavy Oil Viscosity Using Seismic Data
Fereidoon Vasheghani – *University of Calgary*
Seismic attenuation is influenced by the viscosity of heavy oils.

Coupling Reservoir Simulation and Seismic Data in Heavy Oil Fields
Dr. Laurence Lines – *University of Calgary*
We illustrate the coupling of seismic data and well information to reservoir simulators in cold production of heavy oil.

Mapping Reservoir Heterogeneity in Athabasca Oil Sands Using Surface Seismic Data
Yong Xu – *Arcis Corp.*

TRACK 3: WATER

Membrane Solutions for Coal Seam Methane Produced Water
Thomas Wines – *Pall Corporation*
A case history for the commercial application of hollow fiber microfiltration and reverse osmosis filtration to the treatment of coal seam methane produced water is reviewed.

Production of High Quality Distillate to meet a Fit for Purpose Boiler Feedwater Specification
Keith Minnich – *Veolia Water Solutions and Technologies*
Evaporation of produced water has been used at several SAGD facilities to produce boiler feed water, however, there are no official guidelines for the required quality of evaporator distillate to feed an OTSG or drum boiler that will produce injection steam. This paper presents a basis for a fit for purpose specification.

Produced Water Evaporator Blowdown Treatment and Disposal Methods and Considerations
Nathan Haralson – *GE Water & Process Technologies*
This presentation will provide details of the current treatment strategies for produced water evaporator blowdown based on full-scale operating data and lessons learned as well as compare the technical viability, process reliability, capital costs, and operational costs of these treatment strategies.

TRACK 4: CO_2

Sponsored by: ConocoPhillips Canada

The Cost and Benefits of Carbon Capture and Storage
Hitesh Mohan – *INTEK Inc.*
The paper discusses various carbon capture technologies currently in use and the costs and value options for different CO_2 storage options.

Purification of CO_2 for Sequestration and Low Emissions Venting
Maysar Adams – *SNC-Lavalin Engineers & Constructors*
The subject treatment and purification process provides a CO_2 product at a quality suitable for sequestration and/or low emissions venting – low enough to meet "Minor Source" permitting requirements, and enables essentially complete recovery of valuable syngas components.

High-Efficiency/Low Cost CO_2 Compressor
Peter Baldwin – *Ramgen Power Systems*
Presentation on Development Status Update

10:00 a.m. – 10:30 a.m. COFFEE BREAK

SESSION 6 10:30 a.m. – 12:00 p.m.

TRACK 1: PROJECT MODULAR DESIGN AND CONSTRUCTION - PANEL DISCUSSION

Facilitator: Harold Burnham – *Advisory Energy Consulting, Inc.*

Participants: Derek Macdonald – *Alstom Canada*
Ian Taylor – *Jacobs Engineering and Construction*
David Meldal-Johnsen – *WorleyParsons Engineering*
Parker Hadlock – *Cianbro Corporation*
Bas Bronder – *Mammoet Worldwide Transport*
Terry Manning – *Husky Energy*

TRACK 2: IN SITU

EcoShale in-Capsule Technology
Dr. James Patten – *Red Leaf Resources/EcoShale*
Red Leaf Resources, Inc. has developed a process to economically extract high quality oil from mined oil shale, has completed a field demonstration project on its 16 thousand acre lease on state lands in Utah, and presents results of third party oil analysis and financial modeling for scale up to 30,000 barrel/day production.

Investigation of Fractures Geometrical Properties Effect on Toe to Heel Air Injection (THAI) Process Performance
Dr. Cyrus Ghotbi – *Sharif University of Technology*
This paper deals with simulation analysis of THAI and effect of fissures geometrical properties on the process performance in a low permeable fractured carbonate reservoir called Kuh-E-Mond.

Paper – TBD

TRACK 3: WATER

Water Conservation and Improved Production Efficiency
Charles Marchetta – *Niagara Blower Heat Transfer Solutions*
Closed-loop, evaporative cooling systems (Wet Surface Air Coolers) are a cost-effective heat transfer technology that optimizes use of scarce water resources.

Cumulative Effects of Groundwater Management Strategies for Alberta's Oil Sands
Jon Fennell – *WorleyParsons Canada*
Development of a groundwater management framework to ensure sustainable development in Alberta's oil sands.

Paper – TBD

TRACK 4: ENVIRONMENTAL REMEDIATION

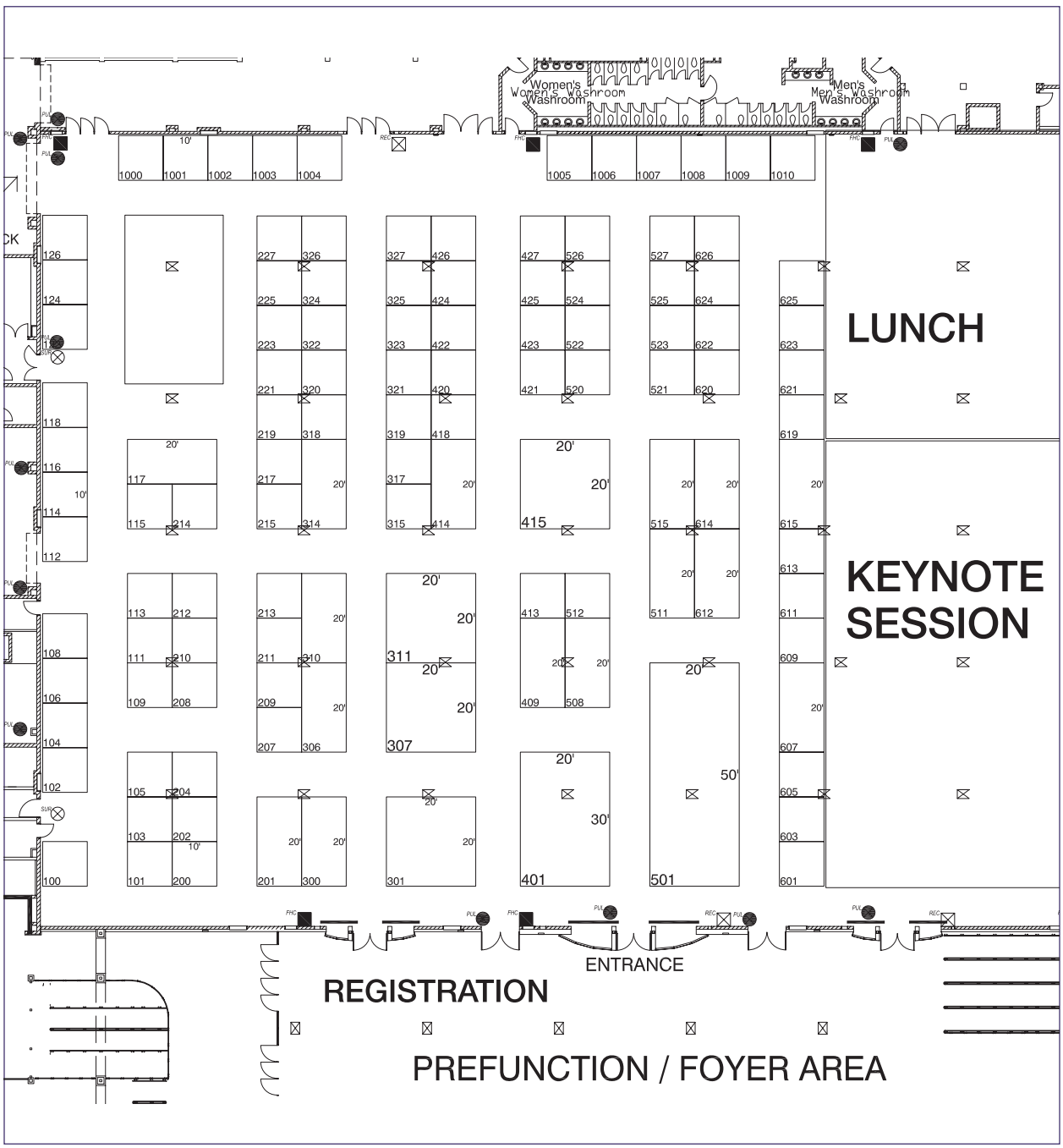
Sponsored by: ConocoPhillips Canada

Participants TBD

12:00 p.m. - 1:00 p.m. LUNCH

1:00 p.m. - 2:30 p.m. CLOSING PLENARY SESSION

Panel Discussion: The Cost of Cleaning "Dirty Oil"
A panel of experts will estimate the costs of meeting environmental expectations facing the oil sands and heavy oil industry and respond to questions and comments from the conference delegates.


Women's Washroom
Men's Washroom
LUNCH
KEYNOTE SESSION
ENTRANCE
REGISTRATION
PREFUNCTION / FOYER AREA

OIL SANDS AND HEAVY OIL TECHNOLOGIES 2008 EXHIBITOR LIST

212 Resources
Alstom Canada
Athabasca University
Babcock & Wilcox Canada
Bedford Reinforced Plastics, Inc.
C-B Energy Recovery
C-B Natcom
C-B Nebraska Boiler
C.G. Industrial Specialties Limited
Cameron
CAR-BER Testing Services
CCS Corporation
Ceradyne, Inc.
Clean Harbors Environmental Services, Inc.
Cleaver-Brooks, Inc.
Clyde Bergemann Power Group
Colossal Transport Solutions, LLC
Cover-All Alberta Ltd.
DryVac Services Canada
EcoSolutions International
EIMCO Water Technologies
Enersul Limited Partnership
EZEFLOW Inc.
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Filterboxx
FlaktWoods
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Flow International Corporation
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LxSix Photonics Inc.
MOGAS Industries Inc.
Multi-Chem
NC Services Group Ltd.
Parker Hannifin Canada
PennEnergy Equipment Exchange
Prairie Steel Products
Quick Oilfield Solutions
Reliability Management Group (RMG)
Rentech Boiler Systems, Inc.
Roxtec Inc
RuggedCom Inc.
SAMCO Technologies, Inc.
Shaw Pipe Protection
T.D. Williamson
Taper-Lok Corporation
Thomson Reuters-Techstreet
Tracerco
TRM Technical Resource Management Inc.
ValvTechnologies Inc.
Veolia Water Solutions & Technologies
Victory Energy
Water & Power Technologies

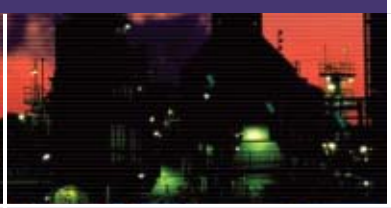
OIL SANDS AND HEAVY OIL TECHNOLOGIES CONFERENCE & EXHIBITION MISSION STATEMENT:

The mission of the Oil Sands and Heavy Oil Technologies Conference & Exhibition is to provide an annual forum that addresses the technical challenges to safely and cost-effectively develop oil sands and heavy oil resources and that encourages the development of young professionals within the industry. The conference is organized to facilitate the open exchange of technology, ideas, best practices, and experiences that impact oil sands and heavy oil projects and operations.

OIL SANDS HEAVY OIL TECHNOLOGIES

Oil Sands and Heavy Oil Technologies Conference & Exhibition
July 14 – 16, 2009
Calgary TELUS Convention Centre, Calgary, Alberta, Canada

www.OilSandsTechnologies.com


CONFERENCE MANAGEMENT

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Fax: +1 918 831 9161 | Toll Free Fax: +1 888 299 8057

PENNWELL CORPORATE HEADQUARTERS:

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OIL SANDS HEAVY OIL TECHNOLOGIES

Oil Sands and Heavy Oil Technologies Conference & Exhibition
July 14 – 16, 2009 | Calgary TELUS Convention Centre, Calgary, Alberta, Canada

2009 REGISTRATION FORM

First Name: _____ Last Name: _____

Title/Position: _____

Company: _____

Address: _____

City/State/Zip: _____ Country: _____ Postal Code: _____

Telephone: _____ Fax: _____

Email: _____

Registration confirmation will be sent via-email, if a unique email address is provided above.

1. Type of Company or Organization:
- ☐ 10 Oil/Gas company
- ☐ 20 Consulting Company
- ☐ 30 Contractor
- ☐ 40 Engineering/Construction
- ☐ 50 Financial
- ☐ 60 Service/Supply
- ☐ 65 Government/Library/Education
- ☐ 70 Other

2. Job Function:
- ☐ 02 Management (CEO, Pres.VP)
- ☐ 05 Engineering/Technical/Geoscience
- ☐ 06 Superintendent/Field Professional/Foreman
- ☐ 10 Purchasing/Consulting
- ☐ 12 Other

3. Areas of Interest/Involvement:
- ☐ 10 Exploration
- ☐ 05 Drilling
- ☐ 01 Production
- ☐ 29 Gas Processing
- ☐ 23 Pipeline/Transportation
- ☐ 15 Re ning
- ☐ 19 Petrochemical
- ☐ 39 Financial
- ☐ 46 Other

4. Purchasing Role: ☐ Specify ☐ Recommend ☐ Approve ☐ None

For Information on corporate packages for 11 or more attendees, contact Registration:
Phone +1 918 831 9160
Email: registration@pennwell.com

3 ways to register:

Pre-register on line before July 8, 2009.

Register on site after July 8, 2009

1
Fax:
Direct: +1 918 831 9161
Toll-Free (US only): +1 888 299 8057

2
Website:
www.oilsandstechnologies.com

3
Mail:
PennWell C&E Registration (OST)
P.O. Box 973059
Dallas, TX 75397-3059 USA

For questions please call:
Phone: +1 918 831 9160
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PennWell

CONFERENCE FEES:

1. Individual Delegate (Full Conference Registration)*
Includes:
- Access to all Conference Sessions
- Access to Exhibition Hall, including any scheduled receptions
- Coffee Breaks in Exhibition Hall
- Delegate Lunch on Wednesday and Thursday (Ticketed)

☐ Paid By June 12, 2009 ..... US$ 825
☐ Paid After June 12, 2009 ..... US$ 995

2. Corporate Plan (5 delegates)
Includes:
- Access to all Conference Sessions
- Access to Exhibition Hall, including any scheduled receptions
- Coffee Breaks in Exhibition Hall
- Delegate Lunch on Wednesday and Thursday (Ticketed)

☐ Paid By June 12, 2009 ..... US$ 3,300
☐ Paid After June 12, 2009 ..... US$ 3,980

Corporate Plan (6 to 10 delegates)
☐ Paid By June 12, 2009 ..... US$ 5,775
☐ Paid After June 12, 2009 ..... US$ 6,965

3. Exhibitor Delegate
Includes:
- Access to all Conference Sessions
- Access to the Exhibition Hall, including move-in and move-out
- Access to Exhibition Hall, including any scheduled receptions
- Coffee Breaks in Exhibition Hall
- Delegate Lunch on Wednesday and Thursday (Ticketed)

☐ Paid By June 12, 2009 ..... US$ 425
☐ Paid After June 12, 2009 ..... US$ 495

*Your full-price registration fee includes a one-year paid subscription to *Oil & Gas Journal* (US$ 83.00 value).

4. ☐ Student Conference Delegate ..... US$ 50
Includes:
- Access to all Conference Sessions
- Access to Exhibition Hall, including any scheduled receptions
- Coffee Breaks in Exhibition Hall
- Delegate Lunch on Wednesday and Thursday (Ticketed)

5. Single Day Conference Delegate (Wednesday OR Thursday)
Includes:
- Access to Conference Sessions on the corresponding day
- Access to Exhibition Hall, including any scheduled receptions
- Coffee Breaks in Exhibition Hall
- Luncheon on corresponding day (Ticketed)

☐ Wednesday, Paid By June 12, 2009 ..... US$ 565
☐ Wednesday, Paid After June 12, 2009 ..... US$ 665
☐ Thursday, Paid By June 12, 2009 ..... US$ 565
☐ Thursday, Paid After June 12, 2009..... US$ 665

6. ☐ Exhibit Visitor ..... US$ 25
Includes:
- Access to Exhibition Hall, including any scheduled receptions
- Coffee Breaks in Exhibition Hall

7. Additional Lunch Tickets (for non-delegates)
☐ Wednesday ..... ( ) @ US$ 40/day
☐ Thursday ..... ( ) @ US$ 40/day

8. ☐ Tuesday, July 14, 2009
An Introduction to Oil Sands & Heavy Oil Industry, Technology & Economics ..... US$ 495
(does not include admission to the conference)

TOTAL PAYMENT AMOUNT **US$** _____

Payment must be received prior to the conference. If payment is not received by the conference date, the registration fee must be guaranteed on charge card until proof of payment is provided. Make check payable to PennWell/Oil Sands Technology 2009.

Cancellation: Cancellation of registration must be received in writing. Any individual, exhibitor, or corporate registrations cancelled in writing before June 12, 2009 will receive a 50% refund of registration fee. After June 12, 2009, no refunds will be permitted. Substitutions may be made at any time by contacting the registration of ce in writing

METHOD OF PAYMENT:

☐ Check enclosed (in U.S. funds only) ☐ Wire (Wire information will be provided on invoice)
Credit Card: ☐ Visa ☐ Mastercard ☐ AMEX ☐ Discover

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OIL SANDS HEAVY OIL TECHNOLOGIES

Oil Sands and Heavy Oil Technologies Conference & Exhibition
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Special rates have been negotiated to accommodate the needs for all conference delegates. By booking your rooms through Preferred Convention Services, the official Oil Sands & Heavy Oil Technologies housing company, you are supporting the Event and gaining access to many benefits.

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- Assistance in setting up hospitality functions at discounted suite rates
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- Experienced reservation agents available from the time you make your reservation until the completion of the event.
- Protection of your reservation in the event of an oversold situation at the conference hotel.

To make your hotel reservation, contact Preferred Convention Services. DO NOT contact the hotel directly. Discounted rates are available only through our office. Availability of discounted conference rates cannot be guaranteed after June 22, 2009.

HYATT REGENCY CALGARY

$239.00 Single or Double Occupancy | Tax: 10.09% | Room rates for the hotel are in Canadian Funds.

Conference Location: Adjacent to the hotel
Hotel Services: Thomsons Restaurant, Sandstone Fireside Lounge, Fitness Center, Full-service Spa, Indoor Pool, Jacuzzi, High Speed Internet
Parking: Valet $35.00; Self Parking $25.00
Airport: Calgary International (YYC) approximately 30 minute drive. Taxi charge approximately $38.00 per person, one-way.
Cancellation Policy: The hotel will charge one night's room and tax for cancellations made 7 days or less prior to arrival. In addition, all reservations cancelled within 30 days of arrival are subject to a $40.00 processing fee.

CHECK ONE: ☐ Exhibitor ☐ Attendee ☐ Other

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H = Hospitality Suite
S1 = 1 Bedroom suite
S2 = 2 Bedroom suite

Rm Type	Guest Name	Arr/Dpt	Sharing room with	Arr/Dpt
		/		/
		/		/
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		/		/
		/		/

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☐ Non-Smoking ☐ Low Floor ☐ High Floor ☐ Early Arrival ☐ Late Departure ☐ Other: _____

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