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REFINING SAFETY PRACTICES

REGULAR FEATURES

COVER

Refining companies have renewed their emphasis upon personal safety and process safety in the aftermath of a March 2005 explosion at BP America Inc.'s Texas City, Tex., refinery that killed 15 people and injured 170 others. The east plant of the BP Texas City refinery is shown on the cover. A special report on refining safety begins on p. 20 with a status report on how BP is responding to key recommendations from the US Chemical Safety Board. Another story, p. 22, describes how refiners can prepare for inspections from the US Department of Occupational Safety and Health Administration. Photo from BP.

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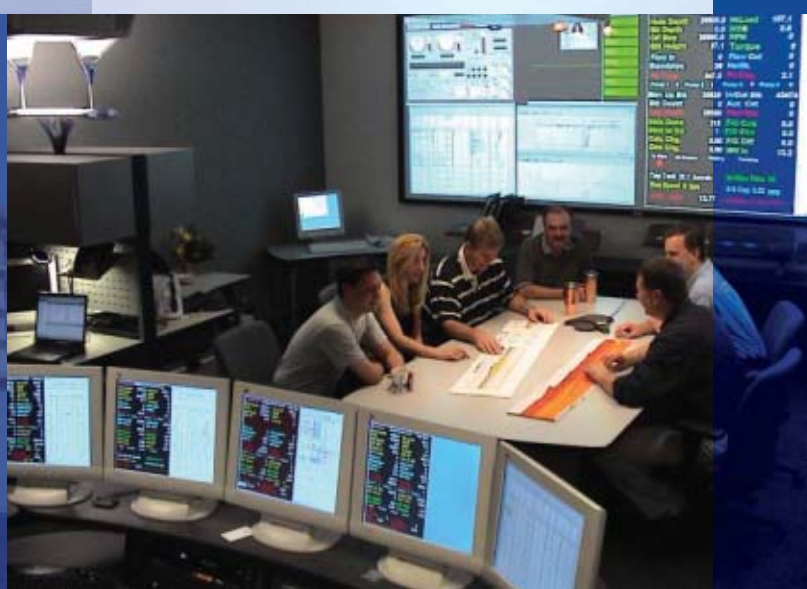
***Dr. Eric van Oort** Planning & Business Improvement Manager, Shell E&P Americas*

Dr. Eric van Oort joined Shell EP Americas in New Orleans in 2000 as a staff drilling engineer and deepwater drilling advisor. His responsibilities at the time included leading Shell EP Americas' fluids and cement team and real-time operations center (RTOC) hubs in the Americas. As RTOC team leader, he played a leading role in establishing the current global network of RTOC hubs and satellites across the Shell Group. Dr. van Oort currently serves on the Regional Wells Leadership Team in Houston as Planning and Business Improvement (PBI) manager, with ownership of various performance improvement initiatives including RTOCs.



***Douwe Franssens** Global Real Time Technology Manager – Halliburton Sperry Drilling Services*

After spending 3 years as the Real Time Solutions Manager for Asia Pacific working with all major clients to design and implement Real Time Solutions for all aspects of the Well Planning, Construction and Production Phases, he is currently the Global Real Time Technology Manager for Sperry Drilling Services responsible for the successful implementation of Real Time projects in all their aspects.

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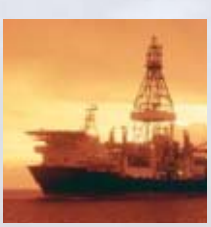

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General Interest — Quick Takes

CFTC seeks comment on NGX registration request

The US Commodity Futures Trading Commission is requesting public comments on Natural Gas Exchange Inc.'s (NGX's) application to register as a US derivatives clearing organization. Its US office is in Houston.

The Calgary-based exchange, which has been operating since February 2004, is owned by the Toronto Stock Exchange's parent company, TSX Group. NGX began an operating alliance earlier this year with the InterContinental Exchange in which NGX uses ICE's front end trading technology and provides clearing services for ICE's US physical gas products, according to information at NGX's website.

It says it lists more than 60 physical and forward gas contracts—which can be delivered at 30 Canadian and US hubs—more than 80 financial gas swaps and options, more than 20 electricity swaps and more than 10 physical gas transport (location) swaps. NGX said an average 2,700 contracts are traded each month on its platform.

Comments should be submitted by Sept. 17 and will be posted at the commission's website, the CFTC said.

Brazil, asked to join OPEC, declines

Iran has invited Brazil to join the Organization of Petroleum Exporting Countries, according to a Brazilian senior government official.

Brazilian oil minister Edison Lobao, in an interview with Brazil's Folha newspaper, said OPEC members believe Brazil will in the future be one of the largest oil producers worldwide.

But Brazil's President Luiz Inacio Lula da Silva, accompanied by Lobao Sept. 2 at the inaugural ceremony for the first oil production in presalt rocks off Espirito Santo state, demurred, saying that Brazil has been investing in its refining capacity in order to become an exporter of fuel, not crude oil.

In June, Lobao made similar claims based on the fact that Brazil was asked to attend a meeting of oil producer and consumer nations in Jeddah. "The simple fact that we were invited for an emergency meeting means, in my view, OPEC intends to invite us to join, if not now, then in the short run," Lobao had said.

Diesel fuel sales decline at US truck stops

Diesel fuel sales have declined at US truck stops in response to higher prices, a national association of truck stop and travel plaza operators reported.

A survey of its 1,100 members also showed that gasoline purchases increased slightly, with a huge shift from premium and midgrade to regular, NATSO said. The Alexandria, Va.,-based trade association was founded in 1960 as the National Association of Truck Stop Operators.

NATSO said the survey found that the average monthly diesel sales volume fell 5.2% year-to-year to 906,700 gal in June and 4.5% to 898,109 gal in July. During that period, it noted, data compiled by Oil Price Information Service showed that truckers paid an average $1.74/gal more in June and $1.76/gal more in July than a year earlier.

The declines began after volumes began 2008 with strong growth, NATSO said. Sales were 6% higher year-to-year in January and February, 2.5% lower in March and 2% higher in April before falling sharply (5.8%) in May, it indicated.

Meanwhile, NATSO members reported that gasoline sales volumes at their truck stops grew an average 1.5% year-to-year in June and 1.8% in July. Premium gasoline sales fell 17% in June and 19% in July, while mid-grade gasoline sales declined nearly 13% in June and 16% in July, the association said.

It said OPIS data show gasoline prices were $1.03/gal higher year-to-year in June and $1.09/gal higher in July.

The US Energy Information Administration reported Aug. 25 that retail diesel fuel prices fell for a sixth consecutive week to an average $4.145/gal nationwide but remained $1.282/gal higher than their level a year earlier. ✦

Exploration & Development — Quick Takes

OMV begins Austrian gas production

To boost Austria's energy supply, OMV AG has started natural gas production from Strasshof and Ebenthal fields in the Vienna basin.

The company's domestic production will increase by 20%—about 40,000 boe/d—until 2010. OMG said it cost €210 million to bring the fields on stream.

Strasshof, which holds an estimated 4 billion cu m of reserves, was discovered in 2005. OMV has since drilled four additional wells and spent €175 million to construct gas processing facilities and expand the existing sour gas treatment plant at Aderklaa. At the first expansion stage, Strasshof's maximum production will be 4,000 boe/d—20% of the company's overall production.

Ebenthal, which has gas reserves of 1.5 billion cu m, cost €35 million to develop. OMV built gas treatment facilities and revamped the Auersthal compressor station. A 16-km pipeline will link the field to the compressor station. Ebenthal output will hit 3,000 boe/d in September, which will represent 15% of OMV's domestic gas production.

OMV will invest €250 million in 2008 and again in 2009 to boost Austrian oil and gas production for long-term supply secu-

Industry Scoreboard

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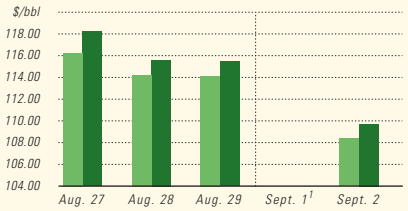
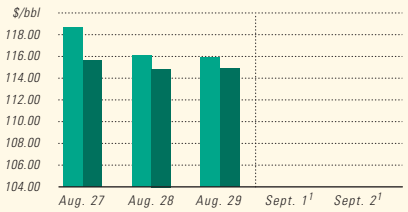
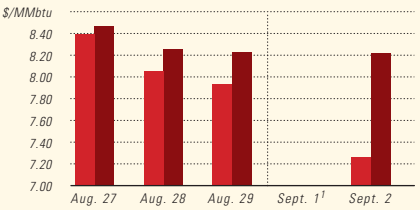


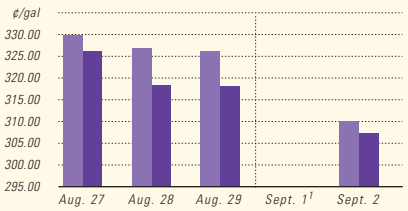
WTI CUSHING / BRENT SPOT



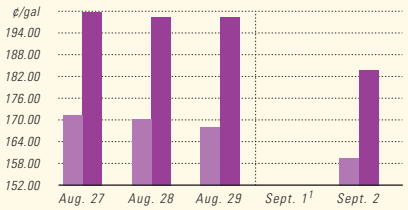
NYMEX NATURAL GAS / SPOT GAS - HENRY HUB



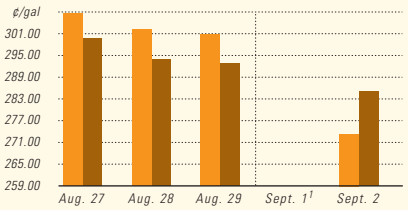
IPE GAS OIL / NYMEX HEATING OIL



PROPANE - MT. BELVIEU / BUTANE - MT. BELVIEU



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



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

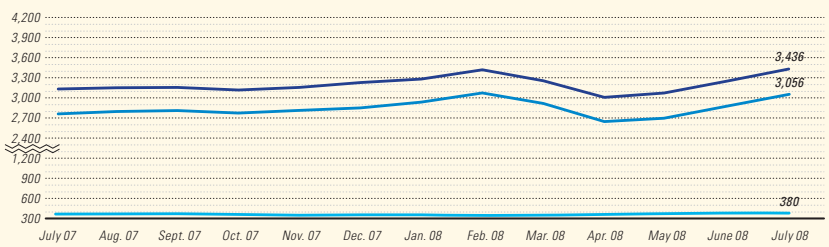
US INDUSTRY SCOREBOARD — 9/8

Latest week 8/22	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	9,441	9,597	–1.6	9,143	9,295	–1.6
Distillate	4,208	4,116	2.2	4,140	4,216	–1.8
Jet fuel	1,576	1,693	–6.9	1,562	1,634	–4.4
Residual	586	738	–20.6	613	742	–17.4
Other products	4,396	4,812	–8.6	4,742	4,822	–1.7
TOTAL DEMAND	20,207	20,956	–3.6	19,984	20,740	–3.6
Supply, 1,000 b/d						
Crude production	5,074	4,942	2.7	5,123	5,104	0.4
NGL production[2]	2,444	2,417	1.1	2,251	2,368	–4.9
Crude imports	10,205	10,222	–0.2	9,876	10,044	–1.7
Product imports	2,952	3,442	–14.2	3,170	3,573	–11.3
Other supply[3]	1,353	1,022	32.4	1,411	1,056	33.6
TOTAL SUPPLY	22,028	22,045	–0.1	21,831	22,145	–1.4
Refining, 1,000 b/d						
Crude runs to stills	14,902	16,086	–7.4	14,902	15,163	–1.7
Input to crude stills	15,124	15,861	–4.6	15,124	15,449	–2.1
% utilization	86.3	90.9	—	86.3	88.5	—

Latest week 8/22	Latest week	Previous week[1]	Change	Same week year ago[1]	Change	Change, %
Stocks, 1,000 bbl						
Crude oil	305,937	296,547	9,390	337,118	–31,181	–9.2
Motor gasoline	196,620	202,822	–6,202	196,231	389	0.2
Distillate	132,068	131,587	481	129,025	3,043	2.4
Jet fuel-kerosine	40,925	40,786	139	41,918	–993	–2.4
Residual	36,863	36,435	428	36,476	387	1.1
Stock cover (days)[4]			Change, %		Change, %	
Crude	20.5	19.7	4.1	21.2	–3.3	
Motor gasoline	20.8	21.5	–3.3	20.4	2.0	
Distillate	31.4	31.3	0.3	31.0	1.3	
Propane	52.4	48.4	8.3	54.7	–4.2	
Futures prices[5] **8/29**			Change		Change	%
Light sweet crude ($/bbl)	115.63	114.45	1.18	72.17	43.46	60.2
Natural gas, $/MMbtu	8.01	8.27	–0.27	6.90	1.11	16.1

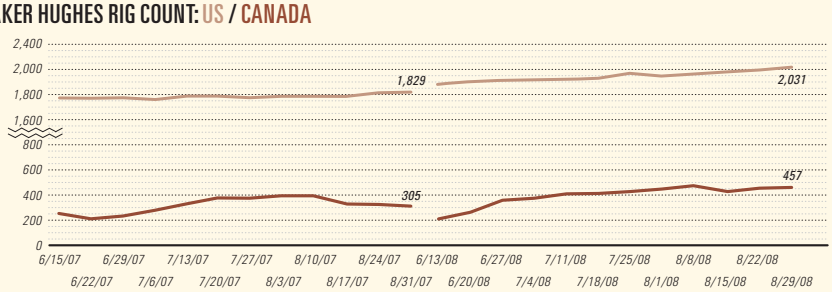
[1]Based on revised figures. [2]Includes adjustments for fuel ethanol and motor gasoline blending components. [3]Includes other hydrocarbons and alcohol, refinery processing gain, and unaccounted for crude oil. [4]Stocks divided by average daily product supplied for the prior 4 weeks. [5]Weekly average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

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"Environmentally sound production technologies and low emissions are particularly important for OMV," a company spokesperson said. "With Baumgarten becoming an increasingly important Central European gas hub, additional gas storage opportunities are being investigated."

At the end of 2007, OMV's Austrian reserves were 143 million boe, with natural gas reserves of 14.8 billion cu m and crude oil reserves of 56 million bbl.

Total seeks Syrian oil block PSA extension

Total SA Chief Executive Christophe de Margerie will accompany French president Nicolas Sarkozy on a recent state visit to Syria aiming to negotiate the extension of an oil block agreement.

A spokesperson for the French firm said De Margerie wants Syria to extend the existing production-sharing agreement for the Deir Ezzor area in the northwestern part of the country by 10 years to 2021 from 2011.

Discussions between the two sides began in early April over the current agreement, signed in 1988, which allows Total to produce some 30,000 b/d of oil at Deir Ezzor.

At the time, Syrian Oil Minister Sufian Al Alao said the government wanted to boost oil production levels by awarding exploration contracts to international companies.

His statement came just days after Syria signed an agreement with China National Petroleum Corp. to build a 100,000-b/d refinery in the same region as the Total concession.

"The refinery would process heavy crude oil produced in Deir Ezzor area," the oil minister told a news conference on the sidelines of an oil and gas show in Damascus.

CNPC would own 85% of the refinery, while Syria would own the rest, he said. Syria would buy products from the refinery, he added without saying how much the refinery would cost.

Al Alao also said plans were proceeding on another refinery at Deir Ezzor having a processing capacity of 140,000 b/d. It is set to be built jointly with Kuwait's Noor Investment Group.

Delaware basin shales strain for economics

The Mississippian Barnett shale has the potential to be a prolific gas producer in the Delaware basin, write geoscientists in the AAPG Bulletin.

One well is reported to have an estimated ultimate recovery of 9 bcf, said Travis J. Kinley of Texas Christian University and fellow authors. Drilling and stimulation costs to as deep as 18,000 ft began at more than $18 million and have been reduced to about $8 million.

Interval A at the top of the Lower Barnett typically has resistivities of 50-100 ohm-m and "is believed to be a significant zone of gas saturation within the Barnett," they reported.

For the most part, however, shale gas plays in the basin have resisted efforts for viable economic development.

Both the Barnett and Devonian Woodford shales should be evaluated, but silica content is less than in the Fort Worth basin. Shale is brittle and will not fracture as well, and proppant embedment may be a problem, the authors wrote.

Shales can slough in horizontal wells, and the high pressures challenge frac pumping equipment.

Even so, a few wells have made initial flow rates of up to 3 MMcfd, and IP at the best well was 5 MMcfd, but decline rates are steep. Chesapeake Energy Corp. and Hallwood Energy Corp. have commercial gas sales.

Using logs from 150 wells in a study area of 500 sq miles in the northern part of the basin in West Texas and Southeast New Mexico, Kinley el al. said that areas for future exploration focus can be delineated by mapping a net resistivity greater than 50 ohm-m. No core was available, but the group studied mud logs and cuttings from five wells.

They noted that the first Delaware basin shale gas wells were drilled in southwestern Reeves County in 2002, and shale gas activity in West Texas has waxed and waned over the last 5 years.

They also noted that it took years to discover the correct combination of drilling and completion techniques to tap gas in the Barnett shale in the Fort Worth basin.

Talisman encouraged by Utica shale test

Talisman Energy Inc. announced what it calls encouraging results for its Quebec unconventional program following a Utica shale test.

The Gentilly vertical well, a reentry to a previously drilled Trenton-Black River well, flowed 800 Mcfd from one completed interval on a sustained basis on test for 18 days.

At the time of the shutin, the well was still cleaning up, and pressures and flow rates were constant.

Talisman, holding a 75% interest, operates the Gentilly well, which is on the south side of the St. Lawrence River about 100 km south of Quebec City.

John A. Manzoni, Talisman president and chief executive officer, said additional testing is planned for the well, including zones within the Basal Lorraine and Lorraine shale formation.

The Lorraine shale sits on top of the Utica and can be up to 6,500 ft thick. The Utica shale is 300-1,000 ft thick.

Early indications show both the Lorraine and Utica rocks are thick, porous, and appear brittle and over pressured, all of which are conducive to artificial fracture stimulation.

Gassco lets seabed surveys contract

Gassco AS has let a contract to Sweden's Marine Matteknikk AB to start seabed surveys in September for potential carbon dioxide pipelines.

The company will shoot 636 km of seabed surveys over 19 days. Data will be collected to determine transport routes to be further developed during the preengineering phase in first quarter 2009.

The work underpins Gassco's investigation to transport captured CO_2 from flue gas emitted by Naturkraft's 420-Mw gas-fired power plant at Karsto and the thermal power plant under development at Mongstad. Gassco is working with Gassnova SF and the Norwegian Petroleum Directorate to develop technical solutions.

"Suitable locations on the Norwegian Continental Shelf shall be evaluated for the sequestration of the captured CO_2," Gassco said. ✦

Drilling & Production — *Quick Takes*

Sevan orders drilling equipment for deepwater rigs

Sevan Marine ASA has let a $240 million contract to Aker Solutions to provide two drilling equipment packages and possibly a third for deepwater drilling rigs that are under construction.

"The contracts will cover delivery of complete drilling packages consisting of engineering and equipment deliveries," Sevan said.

Aker Solutions will deliver equipment for Sevan's first drilling rig in 2009. A spokesman from Sevan Marine told OGJ that both rigs were deepwater floaters based on the cylindrical Sevan 650 design. The rigs are capable of operating in 10,000 ft of water. "One rig will drill off Brazil and the other [off] India."

The rig for Brazil will start operations in mid-2009 in the Santos presalt cluster basin. The other, for India's Oil & Natural Gas Corp. Ltd., will be delivered in 2010.

Petrobras begins Jubarte presalt oil production

Brazilian President Luiz Inacio Lula da Silva, aboard platform JK P-34, has launched oil extraction from the presalt layer of Jubarte field in the Campos basin off the state of Espirito Santo.

Petrobras will use the P-34 platform, which has been producing from other undersea wells since December 2006, to produce the first presalt crude, estimated at 18,000 b/d at full capacity.

The firm also said that production from the well will provide knowledge that will help it develop the presalt reserves in Espirito Santo and in other areas off the Brazilian coast.

"This is the fundamental data that will be used to develop these new areas," said Petrobras E&P director Guilherme Estrella, who added that Jubarte field will accelerate the learning process needed to bring online other large presalt fields such as Tupi.

Petrofac begins Don fields drilling campaign

Petrofac Energy Developments has spudded the first well on the West Don field in the UK North Sea, which is expected to start production in second-quarter 2009, along with Don Southwest field. The company is using the Transocean John Shaw semisubmersible drilling rig.

The fields, 150-km northeast of the Shetland Islands, are in 170 m of water. West Don is on Blocks 211/13b and 211/18a. Petrofac will drill seven wells on the fields over the next year, with three sequential wells on West Don prior to moving across to Don Southwest early in 2009.

Petrofac has begun laying the infield pipelines and export infrastructure for the fields' development. Pipeline trenching is also complete. The installation of the subsea structures and diving tie-ins is scheduled to start at the end of August.

Initially oil will be exported by offshore tanker loading for 6 months and then will switch to pipeline export via a subsea line to Lundin Petroleum's Thistle platform and the Brent pipeline system. Terms have now been agreed with Lundin Petroleum for the export service.

Don Southwest's oil production is expected to hit 12,000 b/d at peak rate and will decline over 10 years. It will cost £200 million to bring on stream.

Petrofac will invest £200 million to drill two production wells and one water injection well in West Don, where Petrofac hopes to produce 20,000 b/d of oil at peak rate.

"The project remains on target for first oil production during the first half of 2009, delivering significant value for Petrofac and the field's joint venture partners," said Bill Dunnett, executive vice-president, project development, for Petrofac Energy Developments.

Petrofac Energy Developments operates both Don Southwest, with a 60% working interest, and West Don 27.7% working interest. ✦

Processing — *Quick Takes*

Chevron plans base oil plant at Pascagoula, Miss.

Chevron Corp. has applied to the Mississippi Department of Environmental Quality for an environmental permit to build a premium base oil facility at the company's 330,000 b/d refinery in Pascagoula, Miss. The refinery produces gasoline, jet fuel, diesel, and other products.

The base oil facility is expected to produce about 25,000 b/d of premium base oil for use in manufacturing high-performance lubricants such as motor oils for consumer and commercial uses. The facility will use Chevron's proprietary isodewaxing technology, which results in higher yields and enables use of a broader range of crude oil feedstocks.

Chevron expects to begin construction in early 2009 and to complete in 2011.

"These oils are the primary ingredients in the production of top-tier motor oils needed to improve fuel economy, lower tailpipe emissions, and extend the period between oil changes," said Dale Walsh, president, Chevron global lubricants.

Napesa to build Saenz Pena, Argentina, refinery

Argentina's Chaco province, which recently announced plans to promote oil exploration, has signed a letter of intent with local firm Empresa Nacional de Petroleo SA (Napesa) for the construction of an oil refinery in Saenz Pena.

The provincial government said the refinery, to be built with a combination of public and private investment, is slated to begin operating in March or April 2009 and will produce gasoline, fuel oil, asphalt, and diesel.

Napesa has agreed to provide the materials and services to construct and start up the refinery, while the provincial government will create a fund to guarantee the supply of crude oil for the operations.

The announcement follows reports in July that the Chaco government passed Decree 1884, which authorizes the provincial Ministerio de Infraestructura, Obras, Servicios Publicos y Medio Ambiente to award permits and contracts for the exploration and production of oil and gas.

Dalian refinery receives Saudi crude

PetroChina's recently expanded refinery in Dalian received its first cargo of Saudi Arabian crude on Aug. 26.

Saudi Aramco said the 2 million bbl cargo of Arabian Light was carried in the Olympic Legend very large crude carrier. The cargo shipped out earlier in August (OGJ Online, July 28, 2008).

In June Dalian Petrochemical Co. commissioned new units that doubled its crude capacity to 410,000 b/d.

The units commissioned include a new 200,000 b/d crude distillation unit, 74,000-b/d hydrocracker, 123,000-b/d kerosine-gas oil hydrotreater, 51,000 b/d continuous catalytic regeneration reformer, 40,000-b/d residue desulfurization unit, 200,000 cu m/hr hydrogen manufacturing unit, and a 270,000 tonne/year sulfur recovery unit. ✦

Transportation — *Quick Takes*

Colombian oil line to link Rubiales field

A contract has been awarded for construction of a 24-in., 235-km pipeline to connect Rubiales heavy oil field in east-central Colombia to the OCENSA pipeline.

Pacific Rubiales Energy Corp., Toronto, and Ecopetrol SA awarded the contract to Consorcio Rubiales-Monterrey, a joint venture of Spiecapag and Ismocol. The pipeline is to be called Oleoducto de los Llanos Orientales.

The line will extend from Rubiales field on the Rubiales and Piriri association contract areas in Meta Province to the OCENSA Monterrey station in Casanare Province. Completion is set for Sept. 30, 2009.

Capital commitments for the project so far include $320 million, including $190 million for the lump-sum fixed-price contract, the pipe, and procurement of long lead time items. Contract for the Rubiales pump station is to be awarded separately.

The local partner Ismocol de Columbia has 20 years of experience in the Colombia oil and gas industry.

Pacific Rubiales, which will own 35% of the pipeline, said the project will "leverage the future development of the very prospective Los Llanos heavy oil basin."

WBI to expand Grasslands pipeline capacity

Williston Basin Interstate Pipeline Co., (WBI) the wholly owned natural gas transmission pipeline subsidiary of MDU Resources Group Inc., reported it will expand firm transportation capacity on its existing Grasslands Pipeline to 213 MMcfd from the current 138 MMcfd—a 54% increase. Project cost is expected to be about $28 million.

The 253-mile Grasslands pipeline extends from the Powder River basin in northeastern Wyoming to western North Dakota, where it connects with the Northern Border pipeline.

The project will include the construction of two new compressor stations; one in western North Dakota near Golva, the other in the far corner of southeastern Montana near the Wyoming border. Additional horsepower also will be added to an existing compressor station near Manning, ND. The targeted in-service date is August 2009, pending timely receipt of the necessary regulatory approvals.

Williston Basin conducted an open season on the expansion project in early July, seeking customer commitment for the additional capacity, and the resulting strong customer demand resulted in the expansion project. The Grasslands pipeline held an initial capacity of 80 MMcfd when it was placed in service in late 2003. Since installation, the pipeline has been incrementally expanded, bringing firm transportation capacity to its current total.

Woodside puts North West Shelf Train 5 online

The North West Shelf gas project's fifth LNG train at the Woodside Petroleum-operated facilities on the Burrup Peninsula near Karratha in Western Australia has been brought on stream.

The Train 5 project, built at a cost of $2.6 billion (Aus.), includes the fifth train, a jetty extension, and a second LNG loadout berth. In addition the Burrup plant has been provided with two more power generation units, a third LPG fractionation unit, a new fuel-gas compressor, an acid gas removal unit, and a third boil-off gas compressor.

The new train has increased the gas project's capacity by 4.4 million tonnes/year to a total output of 16.3 million tonnes/year.

Woodside operates the new infrastructure for a consortium consisting of itself, BHP Billiton, BP Developments Australia, Chevron Australia, Japan Australia (MiMi) and Shell Australia. All have a one-sixth interest.

Enterprise books Barnett shale shipping

Affiliates of Enterprise Products Partners LP have signed long-term agreements with major Barnett shale natural gas producers for about 900 MMcfd on its 1.1 bcfd-capacity Sherman Extension pipeline. Enterprise also will construct a pipeline to move gas supplies produced from Barnett shale wells in Tarrant and Denton Counties, Tex., to the Sherman Extension pipeline.

The 178-mile Sherman Extension runs from an interconnect with Enterprise's Texas intrastate system in Erath County, Tex., to Grayson County, Tex., where it will connect to Boardwalk's Gulf Crossing interstate pipeline. Devon had been the primary capacity holder on the Sherman Extension under previous agreements. Enterprise has the option to acquire as much as a 49% interest in Gulf Crossing (OGJ, May 12, 2008, p. 55).

Enterprise also will build a 40-mile supply lateral from the Trinity River basin north of Arlington to an interconnect with the Sherman Extension near Justin, Tex. The new pipeline will consist of 30-in. and 36-in. pipe designed to provide as much as 1 bcfd of gas takeaway capacity for producers in Tarrant and Denton counties. The line also will have a lateral for gas produced from the Newark East field in Wise County. Long-term agreements with major producers are in place to anchor these lines, which are expected to be in service in third quarter 2009.

Enterprise completed a 42-mile section of the Sherman Extension from Erath County to Parker County, Tex., in August and commenced interim transportation service on it to markets utilizing Enterprise's Texas intrastate system. ✦

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Letters

Warming letter questioned

I note the letter from David Archibald (Aug. 11, 2008, p. 12). As a chemical engineer I found this objectionable for its misuse of specific research data and its general attempt to cloud the issue of global warming with misleading and spurious arguments. Let us examine the following:

a) A search on the web leads us to find that Archibald is on the board of a business interest group, The Lavoisier Group, established by the coal industry in Australia, with the goal of protecting that industry.[1]

b) Archibald starts with a statement designed to confuse, about the logarithmic relationship of carbon dioxide to global warming. Why do I say confuse? Environmental scientists and modelers know about this relationship, and this effect is indeed included in the climate models, so pointing it out does not change the forecast in the slightest and serves only as a distraction.

c) Archibald uses the University of Chicago Modtran facility[2] (Modtran is a self-contained program which models the physical atmosphere and computes the effect that the atmosphere has on propagated electromagnetic radiation, e.g. visible light and thermal infrared) to estimate the consequences of changes in carbon dioxide. The University of Chicago responded that Archibald makes an error in using their program, as he "multiplies the radiative forcing by an absurdly low value of the climate sensitivity parameter," which renders his results meaningless.[3]

d) In Archibald's previous presentations, which are not peer-checked or published in learned journals and on which his letter appeared to be based, he has been extremely selective with the data used to come to his conclusions. "To undertake his computations, which are supposed to indicate a strong correlation of surface temperature to the solar cycle, rather then use worldwide temperature estimates (GISS, HadCRU, etc.), he uses five stations, all from the southeast continental US, all within several hundred kilometers of each other." This same source continues, "In

order to make his 'predictions' of global temperature response Archibald uses not five stations but one station's data (De Bilt in Holland). One data point. Of the thousands available. Strangely enough, each station shows a cooling trend."[3]

e) Archibald comes out with a strong statement—"Atmospheric temperature rose 0.7° in the 20th century; it has also fallen by the same amount in the last 18 months"—but offers no basis to support this claim. Another distraction. In fact, real world data indicates that the warming up to 2007 is occurring at the upper end of the projection.[4]

f) As for the sun's activities, we have many learned sources which contradict Archibald flatly and say that the sun cannot be responsible for present global warming, such as from the British Royal Society: "Direct satellite measurements of solar activity show it has been declining since the mid-1980s and cannot account for recent rises in global temperatures, according to new research."[5]

I am not a climate scientist and do not pretend to be one. However, a review of published literature where articles and papers are normally subject to peer review and criticism, before as well as after publication, far, far outweigh anything Mr. Archibald and his fellow skeptics may have to say on the subject. It is my belief that letters of the nature submitted by Mr. Archibald are intended to create a sense of doubt and hesitation for the lay public. Frankly, the message from Mr. Archibald sheds no new light on the topic, and goes against the consensus. The case for global warming has been accepted by the vast majority of global scientists and by governments, and we need to act and to act now.

Jeff Temple
Petrokazakhstan Oil Products
Shymkent Refinery, Kazakhstan

References

1. http://www.lavoisier.com.au/.
2. http://climatepolice.com/Climate_Outlook_2030.pdf, p. 3.
3. "My model used for deception," http://www.realclimate.org/index.php/archives/2007/10/my-model-used-for-deception/langswitch_lang/in, plus personal communication from David Archer, professor in the Department of Geophysical Sciences at the University of Chicago.
4. Rahmstorf, Stefan, et al., "Recent Climate Observations Compared to Projections," Potsdam Institute for Climate Impact Research, Science, Vol. 316.
5. Proceedings of the Royal Society A (DOI:10.10.98.rspa.2007.1880).

Calendar

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

OIL&GAS JOURNAL online

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

2008

SEPTEMBER

HGS/PESGB African Conference, Houston, (713) 502-2766, (281) 679-5504 (fax), e-mail: africa08@att.net, website: www.hgs.org/en/cev/887. 8-10.

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

Rice Global Engineering & Construction Forum, Houston, (713) 552-1236, ext. 3, (713) 572-3089 (fax), website: www.forum.rice.edu. 9.

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

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

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

Rio Oil & Gas Conference & Expo, Rio de Janeiro, 55 21 2112 9078, 55 21 2220 1596 (fax), e-mail: riooil2008@ibp.org.br, website: www.riooilegas.com.br. 15-18.

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

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

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

Energy Institute Decommissioning Conference, Aberdeen, + 44 (0) 20 7467 7106, + 44 (0) 20 7580 2230 (fax), e-mail: hetheridge@energyinst.org.uk, website: www.energyinst.org.uk/events. 23.

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

DGMK Future Feedstocks for Fuels & Chemicals Conference, Berlin, 040 639004 0. 040 639004 50 (fax), website: www.dgmk.de. Sept. 29-Oct. 1.

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

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

OCTOBER

GPA North Texas/NGS East Texas Red River Conference, Tyler, Tex., (713) 222-0852, (713) 222-0858 (fax), e-mail: tom.rommel@accessed.com, website: www.gasprocessors.com. 1-2.

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

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

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

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

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

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

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

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

Calendar

Oil Shale Symposium, Golden, Colo., (303) 384-2235, e-mail: jboak@mines.edu, website: www.mines.edu/outreach/cont_ed/oilshale. 13-17.

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

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

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

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

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

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

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

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

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

GPA Houston Midstream Conference, Houston (713) 222-0852, (713) 222-0858 (fax), e-mail: tom.rommel@accessed.com, website: www.gasprocessors.com. 28-29.

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

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

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

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

NOVEMBER

✦Sulphur International Conference and Exhibition, Rome, +44 20 7903 2410, +44 20 7903 2432 (fax), e-mail: conferences@crugroup.com, website: www.sulphurconference.crugroup.com. 2-5.

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

Abu Dhabi International Petroleum Exhibition & Conference (ADIPEC), Abu Dhabi, +971 (0) 2 4444 909, +971 (0) 2 4444 383 (fax), e-mail: info@adipec.com, website: www.adipec.com. 3-6.

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

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

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

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

GITA's GIS Annual Oil & Gas Conference, Calgary, (303) 337-0513, (303) 337-1001 (fax), e-mail: info@gita.org, website: www.gita.org/ogca. 6-7.

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

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

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

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

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

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

Annual Houston Energy Financial Forum, Houston, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.accessanalyst.net. 18-20.

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

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

DECEMBER

IADC Well Control Middle East Conference & Exhibition, Muscat, (713) 292-1945, (713) 292-1946 (fax), e-mail: conferences@iadc.org, website: www.iadc.org. 2-3.

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

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

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

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

International Petroleum Technology Conference (IPTC), Kuala Lumpur, +971 (0)4 390 3540, +971 (0)4 366 4648 (fax), e-mail: iptc@iptcnet.org, website: www.iptcnet.org. 3-5.

USAEE/IAEE North American Conference, New Orleans, (216) 464-2785, (216) 464-2768 (fax), website: www.usaee.org. 3-5.

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

PIRA Understanding Global Oil Markets Conference, New York, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 10-11.

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

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

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

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Petrotech International Oil & Gas Conference & Exhibition, New Delhi, +91 11 2436 4055, +91 11 2436 0872 (fax), e-mail: convenor_petrotech@iocl.co.in, website: www.petrotech2009.org/registration.aspx. 11-15.

'Fuelish' gas savers

David N. Nakamura
Refining/Petrochemical Editor

During the course of a normal work day, OGJ editors typically receive many press releases via e-mail publicizing new products of technological developments. These announcements can be anything from "breakthrough" technologies to incremental upgrades of older technologies.

With the higher fuel prices the past few summers, the number of e-mails touting "gasoline-saving" devices seems to increase in direct proportion to the price of gasoline. This summer was no exception.

And with the record-high prices this past summer in the US, it is more likely that consumers will fall for this gas-saving silliness. Unfortunately, none of these devices live up to the hype.

Fuelishness

These "amazing" technologies typically fall into two categories: fuel additives and mechanical devices. Advertised claims of 10-25% increases in fuel economy are common, and some claim up to 70% savings in fuel costs.

The claims of these technologies range from plausible to ridiculous. Some claim to ionize the fuel using metals, which supposedly improves combustion. Other devices claim to enhance the mixing or vaporization of the air-fuel mixture.

Some products claim to "align" the fuel molecules before entering the engine. The manufacturers claim that this alignment resulted in an optimum burn, without describing how this actually worked.

One manufacturer even claims that—using common materials available at any hardware store and using their conversion guide (for a low price of $50, normally a $397 value)—one can easily convert a car to run on a mixture of water and gas. Reading the claims on the product websites can be quite entertaining.

False claims

Sadly, there are probably a few consumers that fall for these products every year. Luckily for consumers, the US Environmental Protection Agency conducts regular testing of these products under its "Gas Saving and Emission Reduction Devices Evaluation" program (www.epa.gov/oms/consumer/reports.htm).

EPA has evaluated more than 100 devices and additives and has found none that significantly improves gas mileage. Testing originates at the request of the Federal Trade Commission, the EPA Administrator, or upon the review of an application from the manufacturer.

EPA divides these devices into these categories: air-bleed devices, vapor-bleed devices, liquid injection, ignition devices, fuel-line devices (heaters or coolers), fuel-line devices (magnets), fuel-line devices (metallic), mixture enhancers (under the carburetor), mixture enhancers (others), internal engine modifiers, accessory drive modifiers, fuels and fuel additives, oils and oil additives, driving habit modifiers, and miscellaneous.

Of the more than 100 devices tested, EPA found that four gave a small improvement in fuel economy; however, these devices increased exhaust emissions. Installing them, according to federal regulations, could be considered illegal tampering.

Another six gave very small improvements in fuel economy, but would have to be evaluated by the consumer for cost effectiveness.

Tried-and-true methods

The web site, www.fueleconomy.gov, lists many traditional methods to increase gas mileage. It is jointly maintained by EPA and the US Department of Energy.

The web site also features: comparisons of new and used vehicles in terms of mileage, emissions, and safety; a lowest-price fuel finder; and information about hybrid and alternative fuel vehicles.

Its gas mileage tips include tried-and-true methods such as: driving more efficiently by observing speed limits, reducing extra weight, and using cruise control; maintaining a vehicles' engine, air filter, and tire pressure; and combining trips when possible.

Anyone tempted to try a gas-saving product with outlandish claims should remember the old adage: "If it sounds too good to be true, it usually is." ✦

Editorial

Gustav a solid test

The oil and gas story from Hurricane Gustav is that the disruption could have been worse. Part of the reason it could have been worse is a bundle of lessons taught by the storm's nastier predecessors of 2005.

Gustav's center made landfall near Morgan City, La., in the late morning of Sept. 1 as a Category 2 hurricane, with maximum sustained wind speeds near 110 mph. En route to Louisiana it crossed much of the oil and gas producing area of the Gulf of Mexico. It also idled a major segment of the Gulf Coast refining, petrochemical, and gas processing industry with personnel evacuations, power outages, and the threat of physical damage.

According to the US Minerals Management, the storm forced the shut-in of all Gulf of Mexico oil production, 1.3 million b/d, and 95% of the gulf's gas production, 7 bcfd. The US Department of Energy's Office of Electricity Delivery and Energy Reliability reported 14 refineries closed on Sept. 1, with total distillation capacity of 2.7 million b/d. That's 15% of Oil & Gas Journal's estimate of total US refining capacity as of Jan. 1. The DOE office said 10 other Gulf Coast refineries, with capacities totaling 3 million b/d, had trimmed operations.

In preparation for Gustav, most oil and gas pipelines suspended operations. Ports, including the deepwater Louisiana Offshore Oil Port, closed. Thirty-one major gas processing plants, representing a combined 16.1 bcfd of capacity, shut down.

Gustav damage minimal

At this writing, on Sept. 3, companies were beginning to inspect facilities. According to early reports, damage was minimal. DOE said, for example, that 16 of the closed gas processing plants reported little damage and would be able to resume operation once gas flow resumed. One of the shut-down refineries was restarting. Several pipelines were operating or restarting. There were no immediate reports of drifting drilling rigs or damaged production platforms. Crucially, however, electric power remained unavailable in much of the area affected by the storm, including Baton Rouge and New Orleans.

If the first hopeful reports hold up, Gustav will prove to have been much less damaging than Hurricanes Katrina and Rita 3 years ago. That double punch destroyed 115 platforms, damaged 52 others, and hurt 535 pipeline segments. Combined, the two storms set 19 mobile rigs adrift and at one point held 4.9 million b/d of refining capacity offline.

Katrina and Rita were stronger storms than Gustav. They were Category 5 hurricanes while over the gulf, with sustained wind speeds exceeding 155 mph. They came ashore as Category 3 storms, with winds speeds of 111-130 mph. Gustav was a Category 3 hurricane during most of its time over the gulf.

Still, Gustav was a major storm that slammed the nexus of US hydrocarbon production and processing. If it proves to have done little damage, a big part of the reason will be preparations improved by the lessons of Katrina and Rita.

Tougher standards

After those hurricanes, the Minerals Management Service, American Petroleum Institute, and company representatives collaborated on toughened design and assessment criteria aimed at improving the abilities of offshore structures to handle wind, waves, currents, and surge. MMS published a rule adopting the new standards before the start of the current hurricane season. An area of major improvement since the 2005 storms, API says, is the mooring of mobile drilling units.

Refiners and pipeline operators also fortified their hurricane preparations in response to the earlier storms, according to API. They have, for example, worked with electric utilities to speed the restoration of power after a storm and expanded their back-up generation capacity. They also have improved communications systems, fortified onshore structures, and enhanced post-storm availability of equipment and material (OGJ Online, Aug. 31, 2008).

Gustav gave these upgrades to US hurricane preparedness a solid test. That the improvements seem to have earned passing grades, however, is no reason to relax. Two days after Gustav went ashore to begin its windy and wet demise, the National Hurricane Center was tracking three other tropical storms with potential to enter the Gulf of Mexico. ✦

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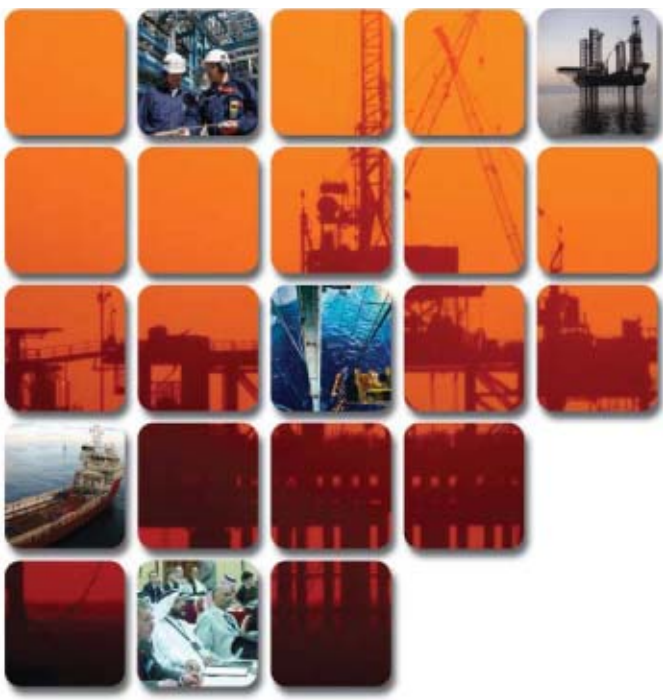

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Refiners apply safety lessons from BP Texas City explosion

Paula Dittrick
Senior Staff Writer

Refiners are applying safety lessons while BP PLC responds to recommendations from the US Chemical Safety and Hazard Investigation Board (CSB) following the deadly Mar. 23, 2005, explosion at BP America Inc.'s Texas City, Tex., refinery.

The CSB directed its Texas City incident recommendations toward BP, the American Petroleum Institute, the US Department of Occupational Safety & Health Administration (OSHA), and others.

This story examines how BP, API, and OSHA are addressing CSB's key recommendations following the explosion that killed 15 people and injured 170 others at the 446,500 b/cd refinery.

BP has increased its health, safety, and environment staff; expanded safety and operations training; and spent more than $1 billion over 5 years to rebuild key gasoline production units, update control systems, and implement other recommendations.

CSB issued a series of recommendations during a 2-year period. A final report cited noncompliance with procedures, inadequate equipment maintenance, and personnel mistakes as contributing factors.

One early, urgent CSB recommendation was for BP to establish an independent panel to evaluate the corporate safety culture at the company's five US refineries.

The panel, chaired by former US Sec. of State James A. Baker III, made extensive recommendations for improved safety leadership at BP's corporate level. The Baker Panel report was completed in January 2007.

Industry reacts

Many oil companies launched voluntary, internal process safety management (PSM) audits based on the Baker Panel report and also CSB's overall recommendations. Some have even conducted process safety culture evaluations. The Baker Panel concluded BP emphasized personal safety to the detriment of process safety (OGJ, Jan. 28, 2008, p. 60).

John S. Bresland, CSB chairman and chief executive officer, said, "The Baker Panel report is one of the more significant reports written on the refining industry in the last 10-15 years. Much of the refining industry is taking to heart the recommendations."

He added that oil companies and chemical companies are studying the reports.

Companies abroad have requested copies of a CSB safety video entitled "Anatomy of a Disaster" about the BP Texas City explosion.

Steve Arendt, a vice-president with ABS Group Consulting, was contracted by the Baker Panel to lead the independent assessment of the five US BP refineries on behalf of the panel. Since then, he has given about 100 presentations to various industries, including talks to more than 40 oil companies.

"The effect of the Baker report and the CSB investigation was the equivalent of an extension of Sarbanes-Oxley to process safety," Arendt said. The Sarbanes-Oxley Act of 2002 requires top executives to certify corporate financial statements. It was enacted as part of the response to questionable accounting practices at companies,

including Enron Corp.

"Process safety is now on the radar screen of boards and chief executive officers," Arendt said. "It became much more of a board-level topic because of the Baker Panel's conclusions about the organizational culture issues that existed in BP at the time of the accident."

Companies have used numerous approaches to apply lessons from the reports of the CSB and the Baker Panel, said Arendt, who encourages senior managers of oil companies to connect the lessons from both technical evaluations and culture evaluations.

"If you don't address organizational culture, then all the problems uncovered from a technical standpoint are likely to return," Arendt said.

Refining is a heavily regulated industry with oversight from OSHA, the US Environmental Protection Agency, the US Department of Transportation, and other federal agencies. API has its own standards and practices program.

API updates standards

CSB asked API to review several of its refining standards. API has about 500 published standards and practices, including more than 100 recommended practices pertaining to PSM.

David Miller, director of API's standards program, said API constantly seeks to improve its standards. In any given year, API normally updates 60-70 standards. API standards are not binding, but they often help regulators determine safe operating practices.

"The CSB recommendations have forced us to step back and refocus on certain issues and look at some additional information," Miller said. "If the lessons learned can be woven into the standards to make them more effective, we certainly want to do that."

In its BP Texas City investigation, CSB concluded trailers were placed too close to a 24,300 b/cd isomerization unit. All 15 fatalities occurred in and around trailers that were as close as 121 ft to a blowdown drum, which released flammable liquid hydrocarbons. About 40 trailers were damaged or destroyed.

"The Baker Panel report is one of the more significant reports written on the refining industry in the last 10-15 years."
—John S. Bresland, CSB chairman and chief executive officer

Upon a CSB recommendation, API revised its standard on the siting of portable buildings at process plants to establish minimum safe distances from hazardous areas. The CSB lists the status of that recommendation as closed and acceptable.

Ron Chittim, API senior refining associate, said a large API task force continues reviewing a siting standard for permanent buildings, such as control rooms, at process plants.

API has finished revising its standard for pressure relieving and depressurizing systems. As of late August, CSB was reviewing that standard. Manuel Gomez, director of the CSB Office of Recommendations, expects that review to be finished within 2-3 months.

CSB found that the BP Texas City blowdown drum lacked functioning equipment that would have warned that it was being overfilled. Chittim said API added some cautionary wording to provide guidance to users of blowdown drums about risk and hazard analysis.

"We do believe there are certain circumstances when blowdown drums are properly designed and operated that they are a reliable pressure-relieving option," Chittim said.

CSB's Gomez said, "BP has basically eliminated the use of the blowdown drums. We hope the industry would generally be moving in the same direction."

In addition, API is working with the United Steelworkers Union to develop an American National Standards Institute (ANSI) standard on performance indicators on process safety and a new ANSI standard on worker fatigue prevention.

ANSI accredits API's standards. In July, representatives from API, ANSI, and the industry met in Houston for an organizational meeting regarding development of the CSB-requested standards. CSB sent observers to that meeting, said Gomez, adding that more meetings are scheduled for September.

OSHA audits refineries

CSB said OSHA conducted only one planned PSM inspection at the BP Texas City refinery in 1998 despite numerous fatal accidents during 1985 to 2005. Other unplanned inspections, typically narrower in scope, did occur.

OSHA fined BP more than $21 million on Sept. 22, 2005, for what CSB called "more than 300 egregious and willful violations" at the plant.

CSB recommended that OSHA implement a national emphasis program (NEP) involving detailed refinery inspections. The refining NEP was launched in June 2007. OSHA's NEP audits are scheduled to be finished by June 2009, but some consultants believe that deadline probably will be extended in some regions with many refineries.

Mike Marshall, PSM coordinator in OSHA's directorate of enforcement programs, said Aug. 28 that OSHA inspectors completed audits at 37 of 81 refineries subject to the NEP audits.

"Of those 37 refineries, we've issued citations in 26," Marshall said. "We're finding more deficiencies than we expected."

NEP involves inspections of contrac-

How refiners can prepare for NEP inspections by OSHA

Inspection teams from the US Department of Occupational Safety & Health Administration are visiting refineries as part of the National Emphasis Program (NEP).

Steve Arendt, a vice-president with ABS Consulting, said NEP inspectors work from two lists of questions. An already published list involves more than 90 "static" questions covering process safety management (PSM) elements.

Arendt

The other list includes "dynamic questions," which are undisclosed in advance. During an audit, OSHA inspectors randomly select 15-20 from a list of 700 possible questions.

Arendt said NEP has its pros and cons.

He said the audits will improve process safety for companies that might not already have been serious about their obligations under the PSM standard.

But he believes most refiners already strive for improved performance and efficiency as defined by the Center for Chemical Process Safety's risk-based process safety guideline.

"The NEP will create a tendency for these companies to divert attention and resources away from a good and continuously improving job in process safety in order to deal with, get ready for, and protect themselves from the NEP," Arendt said.

Mike Marshall, PSM Coordinator in OSHA's Directorate of Enforcement Programs agrees. "It would not be a good situation if employers diverted attention and resources away from continually improving PSM systems to prepare for an NEP inspection."

Costs to refiners

The NEP program could prove costly for refiners and could disrupt refinery operations by requiring the full-time attention of certain refinery employees for a period of a few weeks to several months or more.

"The major cost for a refinery is not necessarily the preparation, but the time spent when OSHA is on site," Arendt said. "The inspectors are in there with five or six people for weeks to months. Then there is the cost of fixing things, although many fixes usually are more analysis and paperwork than capital."

He estimates the NEP cost could amount to "several million dollars" for a medium-size refinery (100,000-200,000 b/d). This includes preparation time, the time to escort OSHA inspectors around the refinery and answer questions, and the amount of time needed for the company to respond after the inspection.

Arendt recommends the following steps before the OSHA NEP team arrives:

- Decide how to prepare, and coordinate that preparation within the company and refinery.
- Contact internal or external legal counsel to address potential issues.
- Develop responses to OSHA's questions before the inspection team arrives.
- Find and organize the records that OSHA inspectors will request.
- Review the status of all process hazard analysis, incident investigations, and cost-analysis action items.
- Conduct limited compliance reviews for areas of concern.
- Develop a communication package for the NEP program by preparing employees, supervisors, and management.
- Identify the refinery subject matter experts and personnel for liaising with OSHA.
- Identify the process for satisfying OSHA requests for documents, tours, interviews, and photographs.
- Consider coordination and information-sharing with other refineries in the company and with industry groups.

Upon arrival of the OSHA NEP team, Arendt recommends that a company:

- Assign a companion to accompany inspectors and scheduled interviews.
- Coordinate OSHA's document requests and logistical needs.
- Conduct daily close-out meetings with OSHA.
- Arrange for experts to be available to explain the refinery's "thought process" on compliance with the NEP inspection questions.

tors as well as refiners. Counting both refiners and contractors, OSHA has completed 86 NEP inspections. As of June 11, a total of 344 PSM citations were issued, including proposed penalties of $2.15 million.

Citations issued

The most frequent NEP refining citations involve mechanical integrity, process hazards analysis, operating procedures, and process safety information, OSHA told participants of the Global Congress on Process Safety.

The US has 151 refineries, but many are exempt from NEP because they are in state-plan states where states enforce the OSHA standards. Other refineries are exempt because they are in the Voluntary Protection Participation (VPP) program.

Bresland told OGJ that he hopes OSHA inspectors entering VPP sites for inspections outside NEP do "a detailed evaluation of compliance with PSM issues." Gomez agreed, saying VPP sites are selected in part because of low injury and illness rates.

"That is precisely the indicator that

we found troubling at the Texas City site because it's an indicator that did not in any way predict all of the shortcomings of process safety," Gomez said. "You can have low injury and illness rates reported, but that is not predictive of very high risk in terms of process safety and very serious problems."

From the time an OSHA inspection team arrives at a refinery, it has 6 months to complete its inspection and issue any citations. Arendt said he knew of at least two inspections that took the full 6 months.

The NEP directive includes a reference section including industry standards, recommended practices, and guidance from API and the American Institute of Chemical Engineers' Center for Chemical Process Safety (CCPS).

CCPS has published what Arendt calls "next-generation" PSM reference guidelines entitled Guidelines for Risk Based Process Safety.

ABS Consulting Senior Process Safety consultant Jim Thompson urges petrochemical plants to maintain high-level PSM programs because OSHA has indicated that a chemicals NEP will be modeled after the refinery NEP.

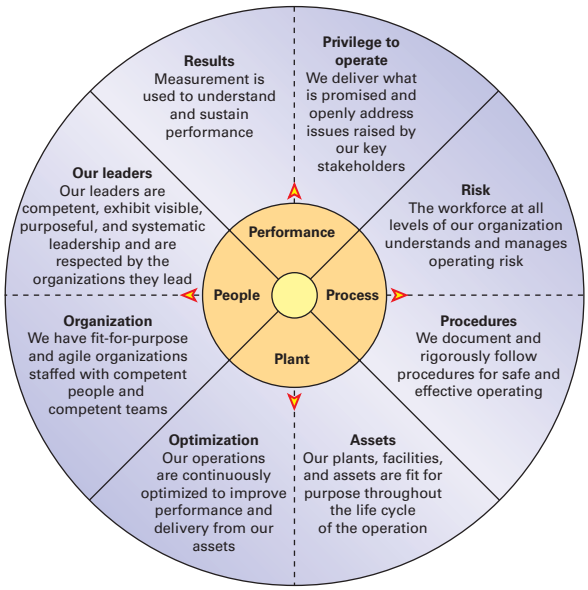
The chemical NEP is expected to involve more OSHA inspectors and take longer than the refining NEP because some 28,000 chemical plants are under OSHA jurisdiction.

CSB also recommended that OSHA amend its PSM standard to require that "a management of change review" be conducted for organizational changes that could impact process safety. These include mergers, acquisitions, reorganizations, and policy changes, such as budget-cutting measures.

Bresland said that recommendation remains open because CSB and OSHA still are having discussions about it.

CCPS also recently published new industry guidelines on management of change, addressing some aspects of organizational change.

Operating management system for BP*



*BP PLC designed a new Operating Management System that is central to its process safety management plan. Each of BP's five US refineries are to create a local OMS using this framework to reduce risk.
Source: BP PLC

Independent expert appointed

BP appointed L. Duane Wilson as an independent expert to make periodic reports to the BP board. Wilson briefs the board's safety, ethics, and environment assurance committee.

A CSB recommendation calls for BP to appoint an additional nonexecutive member to its board. That board member is to have professional experience and expertise in refinery operation and process safety.

Bresland said CSB lists the status of that recommendation as remaining open. "BP is saying they are complying with at least the intent of the recommendation…by hiring a gentleman to evaluate the operation of BP's US refineries for a period of 5 years."

But CSB had asked BP to appoint someone to the board, Bresland notes, adding that more detailed discussions are pending with BP and also with UK authorities on this matter.

"One issue here obviously is that BP is a company that is headquartered in the UK, and the CSB is headquartered in Washington, DC," Bresland said. "We need to make sure that what we recommend falls in with the goals and wishes of the appropriate UK authorities, mainly the health and safety executive in the UK."

In May, Wilson presented his first report. He said BP appears to be making substantial progress in changing culture and addressing process safety improvements.

"BP has stated its intent to become less bureaucratic, reduce complexity, and simplify activities," Wilson said. "A significant amount of work remains to be done on the process safety journey. Successful completion of the task will require the continued support and involvement of the board, executive management, and refinery leadership along with a sustained effort over an extended period of time."

He said all five US BP refineries have made progress addressing recommendations related to facility siting, safety instrumented systems, and area electrical classification. The scope of work in these areas was large, and completion will take time.

"The numbers of open (particularly overdue) process safety action items from incident investigations, process hazard analyses, audits, etc., have been reduced significantly," Wilson said.

A comprehensive audit program was established. An expanded process safety management component was developed and incorporated into the audit program and will be included in the three audits of US refineries planned for 2008.

Extensive programs for training and enhancing process safety competencies are under way for most levels of the organization. Additional programs are under development.

A framework for a new operating management system that focuses on

achieving consistent, efficient implementation of operating processes and systems was developed. Implementation activities are beginning in BP's US refineries.

Wilson said more attention is required to address the following:

- Despite a revised, more restrictive, overtime policy, overtime hours remain at a level that could compromise the performance of plant personnel.
- Tracking of open action items by refining line managers should be expanded beyond audit action items, and overdue items in that list should be reported to all group levels.
- In order to provide more effective support to US refinery personnel, additional clarity around the roles and responsibilities of process safety support staff outside the US refineries is needed.

BP PLC has implemented personal and process safety changes since the 2005 explosion at its Texas City, Tex., refinery. It has eliminated blowdown stacks and established placement guidelines for temporary structures at its refineries. Photo from BP.

Litigation

Meanwhile, BP has worked its way through most of the litigation filed for the 2005 explosion. An Oct. 7 hearing is scheduled in US District Court.

In court filings, BP said it's fulfilling safety requests by federal and Texas state regulations. Meanwhile, most BP Texas City-related litigation in state courts had been resolved by late August.

A proposed federal plea agreement calls for BP Products North America Inc. to pay a $50 million fine for violation of the Clean Air Act and to be on probation for 3 years. Attorneys for accident victims protest that plea agreement, saying it is inadequate. The plea agreement has yet to be approved by a judge.

BP acknowledges there is more work to be done, and the company emphasizes it's committed to preventing a tragedy like this from happening again, a spokesman said.

ABS Consulting's Arendt said some experts forecast that future major incidents will have poor safety culture as a contributing factor. Industry is equipping itself to learn about the underlying organizational and culture causes of major accident situations.

"However, the lessons of the past are likely to be repeated unless companies focus not only on technical safety but also cultural safety," Arendt said. ✦

Republican platform's energy, environment planks no surprise

Nick Snow
Washington Editor

Republicans adopted a 2008 national campaign platform on Sept. 1 that included a call to "aggressively increase our nation's energy supply in an environmentally responsible way...through a comprehensive strategy that meets both short and long-term needs."

"No amount of wishing or hoping can suspend the laws of supply and demand. Leading economists agree that any actions that will increase future energy supplies will lead to lower energy prices today," the platform continued in its section named Energy Independence and Security.

The following section, Environmental Protection, began by noting that increasing domestic energy supplies and decreasing long-term demand for oil would put the US in a position to address the climate change issue "and continue our longstanding responsibility for stewardship over the environment."

The two sections reiterated points that congressional Republicans have raised for months, and which US Presi-

dent George W. Bush mentioned during a Sept. 2 briefing about Hurricane Gustav's possible impacts on Gulf Coast oil and gas production, transmission, and refining operations.

"It's a little early to come up with a solid assessment. There are some encouraging signs," Bush said. US Energy Secretary Samuel W. Bodman will stay in touch with Louisiana Gov. Bobby Jindal and leaders in other states "to help assess what took place and what needs to happen," he added.

More energy, not less

"One thing is certain: When Congress comes back, they have to understand that we need more domestic energy, not less," the president said. "One place to find it is offshore America, lands that have been taken off the books, so to speak, by congressional law. Now, they need to give us a chance to find more oil and gas here at home. I'd much rather American consumers buy gasoline produced from American oil than foreign oil. I'd rather our dollar stay at home than go overseas."

The platform that delegates attending the 2008 Republican National Convention adopted in St. Paul on Sept. 1 stated in its energy plank that increasing domestic production and reducing excessive reliance on imports would bring down high gasoline and diesel fuel costs, create more jobs for American workers and enhance US national security.

"In the long run, American production should move to zero-emission sources, and our nation's fossil fuels are the bridge to that emissions-free future," it added.

It supported "accelerated exploration, drilling, and development in America" not only from new oilfields on the US Outer Continental Shelf but also onshore in Montana, North Dakota, and Alaska. It noted that the Green River basin in Colorado, Utah, and Wyoming "offers recoverable shale oil for development, and most of it is on federal lands."

It supported increasing refining ca-

WATCHING GOVERNMENT

Nick Snow, Washington Editor

Palin's presence may help the GOP

Sen. John McCain's selection of Alaska Gov. Sarah Palin as a running mate could give Republicans a way to more effectively make energy the primary 2008 presidential campaign issue. They have seized it as an offensive in Congress already and probably would relish extending it to the race for the White House.

Many commentators, in their initial reactions, overlooked Palin's tenure on Alaska's oil and gas commission before she beat her predecessor, Frank H. Murkowski, in a 2006 Republican primary en route to a general election victory a few months later.

Palin also currently chairs the Interstate Oil and Gas Compact Commission and the National Governors Association's Natural Resources Committee. That makes her prominent in two major multi-state organizations' energy development and conservation discussions in 2008.

"Gov. Palin has demonstrated first-class leadership on issues critical not only to Alaska, but also to the nation's energy security," IOGCC Executive Director Carl Michael Smith said upon learning of McCain's choosing her as his running mate.

'Topics of importance'

"Throughout her chairmanship of the IOGCC, she has shown her commitment to ensuring we maximize domestic oil and natural gas resources balanced with environmental protection in order to ensure a sound energy future, topics of great importance in the coming election," Smith said.

Palin ran for governor on a platform that included renegotiating a contract to build a gas pipeline from Alaska to the Lower 48 states. She persuaded the legislature to approve a bill which began a competitive process for the project. She also created a state petroleum systems integrity office to oversee equipment, facilities, and infrastructure maintenance, and a climate change subcabinet.

"She's run a huge economy up there in Alaska: Twenty percent of our energy comes from the state, and energy is obviously one of the key issues for our nation's security," McCain said.

ANWR may reemerge

The governor's presence on the ticket also could bring leasing of the Arctic National Wildlife Refuge's coastal plain back into the race. Congressional Republicans already have put Democratic leaders on the defensive with their calls to open more of the Outer Continental Shelf to evaluation, exploration, and development. Compromise proposals, which include some additional OCS access but nothing on ANWR so far—await both the House and Senate when they return.

GOP demands for an OCS vote clearly put pressure on Democratic leaders before the August recess. Senate Majority Leader Harry M. Reid (D-Nev.) kept the voting open 30 minutes longer to get enough votes. In the House, where August recess motions normally are routine, Speaker Nancy Pelosi (D-Calif.) got an August recess motion passed by only a single vote. Several Republicans stayed behind or returned over the next 4 weeks to speak in the darkened chamber.

If Republicans successfully make energy the key 2008 presidential campaign issue, they'll be playing squarely in Sarah Palin's court where her returns of Democrats' shots could be surprisingly effective.✦

pacity and, with sensitivity to environmental concerns, an expedited permitting process.

"Any legislation to increase domestic exploration, drilling, and production must minimize any protracted legal challenges that could unreasonably delay or preclude actual production. We oppose any efforts that would permanently block access to the coastal plain of the Arctic National Wildlife Refuge," it said.

Nuclear, alternates, coal

The platform's energy plank called nuclear energy "the most reliable zero carbon emissions source of energy that we have" and said that Republicans would pursue dramatic increases in its domestic use.

"As new plants are constructed using the highest safety and operation standards, the nation's industrial and manufacturing base will be rejuvenated. The labor force will expand, with nearly 15,000 jobs created for every new nuclear plant built, and those workers will lead the nation away from its dependence on foreign oil," it said.

It also backed a long-term energy tax credit which would apply equally to all renewable power sources including geothermal and hydropower as well as solar and wind power. It supported modernization of the domestic electrical grid and said that Republicans "will work to unleash innovation so entrepreneurs can develop technologies for a more advanced and robust [US] transmission system."

The plank said that while alternatives will shape the US energy future, coal remains a strategic national resource, which must play a major role. It backed coal-to-liquids and gasification technologies, and investment in development and deployment of carbon capture and storage techniques.

"We firmly oppose efforts by Democrats to block the construction of new coal-fired power plants. No strategy for reducing energy costs will be viable without a commitment to continued coal production and utilization," it maintained.

The energy plank's production segment said that more needs to be done to extract more natural gas domestically and make it more of a motor vehicle transportation option. It also called for increased energy cooperation with Canada and Mexico, "including proven oil reserves and vast, untapped Canadian hydroelectric generation."

In its segment dealing with reductions in fossil fuel demand, the plank called for more aggressive applications of energy efficiency measures, and development of alternative fuels. "We must also produce more vehicles that operate on electricity and natural gas, both to reduce demand for oil and cut [carbon dioxide] emissions," it said.

Environment protection

The environmental protection plank called for "measured and responsible steps" to reduce environmental impacts from "the same human economic activity that has brought freedom and opportunity to billions [but which] has also increased the amount of carbon in the atmosphere."

It said that in the short term, Republicans would rely on new technologies to reduce environmental impacts. But it also warned that "innovation must not be hamstrung by Washington bickering, regulatory briar patches, or obstructionist lawyers.

"Empowering Washington will only lead to unintended consequences and unimagined economic and environmental pain; instead, we must unleash the power of scientific know-how and competitive markets."

The environmental plank called for greater cooperation with other countries, including China and India, in dealing with global climate change, and proposed a climate prize "for scientists who solve the challenges of climate change. Honoraria of many millions of dollars would be a small price for technological developments that eliminate our need for [gasoline]-powered cars or abate atmospheric carbon."

It called US progress toward cleaner air and water "a major accomplishment of the American people. By balancing environmental goals with economic growth and job creation, our diverse economy has made possible the investment needed to safeguard natural resources, protect endangered species and create healthier living conditions. . . . That progress can continue if [it is] grounded in sound science, long-term planning and a multiuse approach to resources."

Democratic leaders did not comment on the Republican platform's energy and environment planks specifically. But House Speaker Nancy Pelosi (D-Calif.) criticized Bush's comments at the Sept. 2 news briefing. "For too long, the president's and Republicans' 'drill only' energy policies have reflected the demands of Big Oil. The New Direction Congress is crafting a comprehensive energy strategy that will provide relief for consumers, end our dependence on foreign oil, create millions of jobs, and grow our economy," she said. ✦

IPAMS to Democrats: Quit promoting dishonest energy claims

Nick Snow
Washington Editor

The Independent Petroleum Association of Mountain States on Aug. 28 charged that governmental red tape and environmentalist hindrances are the primary causes of lease development delays, and it urged Democrats to cease the inflammatory and erroneous claim that US producers are just "sitting on" 68 million acres of leased land as the fall campaigns get under way.

"This claim is simply not true,"

IPAMS Executive Director Marc W. Smith said, adding that US House Democrats—from Speaker Nancy Pelosi (Calif.) to Chief Deputy Whip Diana DeGette (Colo.)—continued repeating the false allegation as their party held its national convention in Denver.

House Natural Resources Committee Chairman Nick J. Rahall (D-W.Va.) originally used the 68 million-acre figure on June 12 to justify his proposed "Use it or lose it" bill which would bar leaseholders from bidding on new tracts unless they demonstrated that they were diligently developing what they already held (OGJ July 28, 2008, p. 25).

Republicans have charged that the number came directly from environmental organizations. The Wilderness Society said on May 29 that oil and gas producers were only drilling 11.6 million acres, or 25%, of the nearly 44.5 million acres leased from the US Bureau of Land Management, but the figure did not include offshore leases.

"Companies are doing all they can to develop federal energy resources, but a lease is not a green light to drill: It's the first step in a long, expensive process that is fraught with bureaucratic red tape and protests and lawsuits by environmental groups determined to stop domestic energy development. In fact, this year 100% of BLM lease sales in our region have been protested," Smith said on Aug. 28.

He called a federal oil and gas lease "no more than a definite maybe" because a producer "might" get through environmental analyses and clear regulatory hurdles, "might" get permission to drill, and "might not" see the project delayed by lawsuits.

"Industry is in a classic Catch-22 situation whereby the government has created a cumbersome process that takes years to complete, environmental groups exploit the process to throw up legal roadblocks at every stage, and then Congress and the environmental lobby turn around and blame the industry for not 'diligently drilling,'" the IPAMS official continued.

"If Congress is really concerned about undeveloped leases, it should pass regulatory reforms that ensure government agencies issue permits and environmental analyses within reasonable timeframes and curb the abuses of frivolous lawsuits and protests designed to slow natural gas development," he maintained. ✦

Azerbaijan export pipeline issues prompt Cheney visit

Eric Watkins
Oil Diplomacy Editor

Russian Prime Minister Vladimir Putin claimed that his country's actions in recent hostilities with Georgia "did not in any way damage energy facilities"—including the Baku-Tbilisi-Ceyhan oil pipeline.

Putin's remarks came ahead of a visit by US Vice-President Dick Cheney, who will arrive in Baku Sept. 4, before heading on to Georgia, Ukraine, and an economic forum in Italy.

Analysts said Cheney's visit is intended to secure US and European energy interests in the Caspian-Central Asian region following Russia's military incursion, which last month shut down oil and gas export routes across Georgia.

During the hostilities, Georgia accused Russia of attempting to bomb all three of the main pipelines through the country during the conflict: the Baku-Tbilisi-Ceyhan and Baku-Supsa oil pipelines and the South Caucasus Pipeline, which carries gas to Turkey.

Anatoly Nogovitsyn, deputy head of Russia's general staff during the incursion denied early reports of attacks by his country on the BTC line, saying: "The oil pipeline was never a target that needed to be bombed" (OGJ Online, Aug. 12, 2008).

Independent press reports, however, suggested that Russian warplanes targeted the lines, in addition to the main railway line connecting Azerbaijan with Georgia's Black Sea oil export terminals (OGJ, Aug. 25, 2008, p. 27). The attacks on the railway ended transport of some 50,000-70,000 b/d of crude and products.

In defense of his country's military actions, Putin said: "Russia does not pursue the purpose of interfering in any sort of energy processes in the region and did not in any way damage energy facilities on the Georgian territory."

In reference to the shutdown of the 1 million-b/d BTC line, Putin blamed it on terrorist attacks along the pipeline's Turkish sector, saying that, "There are terror attacks, there is damage, but we have nothing to do with that."

The Russian prime minister, who did not mention the other oil and gas export routes shut down due to the hostilities, said that, "We treat our energy facilities very carefully and we are not going to damage anything. We do not and cannot have such a purpose."

Meanwhile, industry analysts said Cheney will be looking to secure strategic energy corridors feeding oil and gas to the West during his visit to the region this week.

Rasim Musabekov, a political analyst based in Azerbaijan, said that Cheney's visit is first of all connected with energy questions. Azerbaijan and Georgia are parts of a corridor supplying energy resources to Europe, and the US wants assurances that Azerbaijan will continue making oil and gas deliveries through Georgia.

Vafa Guluzade, a Baku-based political analyst and former presidential advisor, said the US is concerned that Azerbaijan will begin sending its energy resources through Russia instead of Georgia, and this question will be one of the main points of Cheney's visit.

WATCHING THE WORLD

Eric Watkins, Oil Diplomacy Editor

Consider the bear necessities

The search for oil and gas takes humankind to some of the farthest reaches of the globe, and there are times when the search may take them into areas that are more controversial than dangerous.

That thought arose last week when five industry groups launched a suit against the US Department of Interior over a rule designed to protect the polar bear.

The groups representing the oil and gas, mining, and manufacturing industries say the rule discriminates against business activities in Alaska that might harm the bear, recently designated as a threatened species.

API sues DOI

The lawsuit was filed in federal court in Washington, DC, by the American Petroleum Institute, the US Chamber of Commerce, the National Association of Manufacturers, the National Mining Association, and the American Iron & Steel Institute.

The five groups want a federal judge to block government plans to review projects in Alaska that might harm the polar bear by contributing to global warming.

The timing of the industrialists' lawsuit could not have been worse, coinciding as it did with reports that nine polar bears were lost in the Arctic Sea and faced with an impossible 640-km swim back to shore because of global warming.

The bears plunged into the sea after the ice floe where they lived melted, and although land was only 100 km away, their homing instinct sent them north towards the ever-shrinking polar ice cap.

Experts with the World Wide Fund for Nature feared that the nine bears, despite being strong swimmers, wouldn't make it back to land on their own.

"The Arctic is a vast ocean and to find nine bears swimming in one area is extremely worrying because it means that dozens more are probably in the same predicament," said Margaret Williams, the director of WWF's Alaska office.

USCG to the rescue?

Williams said animal groups were considering asking the US government to send a US Coast Guard ship to rescue some of the bears because they just might not make it on their own.

"As climate change continues to dramatically disrupt the Arctic, polar bears and their cubs are being forced to swim longer distances to find food and habitat," Williams said.

Professor Richard Steiner, of the University of Alaska's Marine Advisory Program, said the plight of these nine polar bears is an omen of worse to come.

"The bottom line here is that polar bears need sea ice, sea ice is decaying because of the greenhouse effect, and the bears are in very serious trouble," he said.

Trouble of that sort is the last thing that any oil man or woman wants to be associated with, yet the industry is clearly on a collision course with environmentalists over the plight of polar bears.

While considering the bare necessities of exploration and production, the industry might do well to show a deeper concern for the bear necessities, too. ✦

While Cheney will doubtlessly express concern over existing oil and gas export routes in the region, analysts said that he also will want to ensure continued Azerbaijani support for the proposed Nabucco gas pipeline.

Azerbaijan is seen as the key potential supplier for the project, a 3,300-km pipeline that would run via Turkey and the Balkan states to Austria. Construction is scheduled to begin next year, with completion set for 2013.

In competition with Nabucco, Russia backs the rival South Stream gas pipeline, being built by Gazprom and Eni. The South Stream line involves construction of a gas pipeline under the Black Sea from Russia to Bulgaria, with further branches to Austria and Italy. ✦

COMPANY NEWS

BP, Chesapeake establish Fayetteville shale JV

BP America and Chesapeake Energy Corp. plan to establish a joint venture that will produce 180 MMcfd of gas equivalent from shale assets in Arkansas.

According to a letter of intent signed Sept. 2, BP will pay $1.9 billion for a 25% interest in Chesapeake's Fayetteville shale assets. The assets cover 540,000 net acres, which the companies believe could support the drilling of as many as 6,700 future horizontal wells. Following the deal's completion, BP will own 135,000 net acres and Chesapeake will own 405,000 net acres.

In other recent company news:

• TNK-BP Ltd., long under fire from its Russian backers, said the firm's executive vice-president for downstream Tony Considine would leave Sept. 15 to "pursue other opportunities."

"Tony has led the transformation of our refining and marketing business, including value chain optimization," said TNK-BP Chief Operating Officer Tim Summers, who added that Considine's work had improved the company's bottom line.

• Chevron Corp. said two subsidiaries agreed to sell Chevron's fuels marketing business in Brazil to a subsidiary of Ultrapar Participacoes SA for $730 million plus a working capital adjustment. The closing price will be based on exchange rate fluctuations and the actual working capital sold, said officials.

• Imperial Energy Corp. has recommended that its shareholders accept a £1.4 billion takeover deal from Jarpeno Ltd., a wholly owned subsidiary of ONGC Videsh Ltd. (OVL) of India.

• The Canadian government has approved Shell Canada Ltd.'s acquisition of unconventional gas producer Duvernay Oil Corp. for $5.9 billion (Can.). The deal adds to Shell's portfolio acreage in the Western Canadian Sedimentary Basin.

• Australia's Federal Court has approved the merger plans of Arc Energy Ltd., Perth, and Australian Worldwide Exploration Ltd. (AWE), Sydney (OGJ, May 19, 2008, p. 33).

BP, Chesapeake shale deal

This most recent deal marks the second such deal signed between BP and Chesapeake. It follows closely after a $1.7 billion acquisition for the Arkoma basin Woodford shale assets in Oklahoma.

Andy Inglis, BP chief executive of exploration and production, said the JV was a strategic entry into three top-tier shale plays in North America, and BP could acquire 1 billion boe from the shale resources. This deal was critical to BP's developing a leading position in unconventional gas technology and boosting North American onshore natural gas production from its current level of 470,000 boe/d.

It will give Chesapeake $1.1 billion in cash at closing and will pay for Chesapeake's 75% share of drilling and completion expenditures until the outstanding $800 million has been met throughout 2008 and 2009.

Chesapeake is reportedly planning to continue acquiring leaseholds in the Fayetteville shale play. BP said it will have the right to a 25% participation in any such additional leasehold.

Chesapeake is also in discussions with other companies to reach a similar agreement over its Marcellus shale assets, which it hopes to complete by yearend.

Considine to leave TNK-BP

TNK-BP's announcement of Considine's departure came just a month after TNK-BP Chief Executive Robert Dudley left Russia in the face of what he said was "sustained harassment."

Dudley, who has been banned by a Moscow court from working in Russia for 2 years, continues to run TNK-BP from the UK. In the course of his duties this week, Dudley accused Russian labor authorities of abusing their power.

In a letter sent to top officials in the employment, security, justice, and corruption authorities, Dudley said the frequency and timing of inspections carried out against the company suggested "an abuse of power by the (Moscow) State Labor Inspectorate as well as a possible interest on its part in the outcome of the inspections."

In his seven-page letter, Dudley suggested that the abuse of power was instigated by higher authority, saying, "The unambiguous conclusion is that the said officials were carrying out somebody's orders."

Yuri Gertsy, who heads Russia's Federal Service for Employment and Labor Regulations, denied Dudley's claims. Gertsy said the Moscow division acted properly as indicated by the court decision, which said Dudley broke labor laws and [that] barred him from holding executive office for 2 years.

Dudley's leadership of the company is said to be one of the major issues that threatens to break up the 5-year-old partnership between BP PLC and its billionaire Russian partners. The Russian backers have called for Dudley's resignation.

Ultrapar buys Chevron assets

Under terms of the agreement, Ultrapar will acquire a network of 2,000 service stations operating under the Texaco brand, an equity interest in associated terminal operations, and Chevron's commercial and industrial fuels business. Other terms of the agreement were not disclosed.

The sale of retail fuels marketing operations in Brazil is consistent with the company's move to concentrate

downstream resources and capital on strategic global assets, said Mike Wirth, Chevron executive vice-president, global downstream. "By restructuring our worldwide portfolio, we intend to reduce capital employed, deliver stronger returns and achieve more profitable growth," he said.

"Brazil remains an excellent country in which to do business," noted Shariq Yosufzai, president, Chevron global marketing. "We plan to continue growing our presence there by focusing on our lubricants and upstream operations," he said.

Texaco is the fourth-ranked fuel brand in Brazil by sales volumes. Under the Texaco brand, Chevron sells an average of 120,000 b/d of fuel in Brazil.

Jarpeno-Imperial Energy deal

Jarpeno's buyout offer of Imperial Energy continues a major trend where larger operators look to build asset bases overseas to offset dwindling domestic production.

Last month, Imperial announced that an unnamed suitor—believed to be ONGC—had offered a higher, 1,290 pence/share approach. Analysts have concluded that the reduced price was fair and resembled changing market conditions.

R.S. Butola, managing director of OVL, said the company was interested in Imperial because its operations would increase in size and value. "We believe OVL's financial strength and technical expertise will further enhance the attractive growth potential of the business in the Tomsk region. Additionally, we view this as an important opportunity to expand on the continuing cooperation between Russia and India in the energy sector."

Imperial has assets in western Siberia and has reported 450 million bbl reserves under Russian standards. Sinopec, China's biggest state-owned oil company, has also expressed an interest in acquiring Imperial. According to reports, Su Shulin, the company's chairman, said its parent company was doing preliminary work on a bid for Imperial Energy.

OVL, the overseas arm of ONGC, has a 20% stake in the ExxonMobil-led Sakhalin-1 oil and gas project. The Kremlin is preventing the consortium from exporting gas. Analysts have questioned whether OVL can operate in Russia

PERSONNEL MOVES AND PROMOTIONS

Murphy Oil makes executive changes


Deming

Murphy Oil Corp. announced that **Claiborne P. Deming,** president and chief executive officer of the company since 1994, will retire effective Dec. 31. Deming will be succeeded by **David M. Wood,** who currently serves as Murphy's executive vice-president, worldwide exploration and production operations.

Deming will continue as a member of Murphy's board and will succeed **William Nolan** as chairman of the board's executive committee. Nolan will remain board chairman.

Wood joined the company in 1994 and has held several positions including vice-president and senior vice-president of frontier E&P and president of Murphy Exploration & Production Co. In January 2007, Wood became executive vice-president with responsibility for the company's E&P operations. He will assume his new duties as president and CEO effective Jan. 1, 2009.

Upstream moves

Patrick Romeo was appointed president of Royal Dutch Shell PLC operations in France. He succeeds **Christian Balmes.**

Romeo held various posts in the group's downstream sector, including coordinator of the overall downstream businesses in the Middle East, based in Dubai.

Pacific Asia Petroleum Inc., Hartsdale, NY, has appointed **Richard Grigg** as senior vice-president and managing director.

Grigg has served as the company's managing director of its Beijing office since October 2007. He has 38 years of experience in the petroleum industry as well as extensive management and operational experience.

Prior to joining Pacific Asia, Grigg was chief operating officer for Sino Gas & Energy, based in Beijing, and responsible for all activities of the company within China.

Norwood Resources Ltd., Nicaragua operator based in Vancouver, BC, has named **David Grellman** as vice-president, operations.

Grellman will implement and manage Norwood's corporate drilling objectives and develop a practical and effective infrastructure to support all aspects of its drilling, testing, and production operations.

He will also be responsible for the company's health, safety, and environmental policy and will ensure its compliance with Nicaraguan and international oil field standards and practices. Grellman has 36 years' experience with Exlog, Cities Service Oil Co., and Occidental Oil & Gas Corp.

Santos Ltd. has appointed **David Knox** chief executive officer. Knox has served as the Melbourne-based company's acting chief executive since Mar. 25.

without interference from the authorities if its transaction to buy Imperial Energy goes ahead as the Kremlin increases its control over the oil and gas sector.

Imperial Energy was launched in 2004 on the Alternative Investment Market in London with a market capitalization of £2 million. It has progressed to the FTSE 250 and is valued at more than £1.4 billion.

Shell Canada-Duvernay

Wholly owned Shell Canada subsidiary BRS Gas Corp. acquired 97.7% of Duvernay's common shares and will pay for them on or before Aug. 27. BRS Gas offered $83/share for Duvernay in July (OGJ Online, July 14, 2008).

Duvernay has 25,000 boe/d of production, predominantly gas. It plans to increase production to 70,000 boe/d by 2012. Duvernay owns and controls the gas processing and delivery infrastructure in both large project areas.

BRS Gas will buy the remaining Duvernay common shares that were not deposited to the offer. It will then delist Duvernay's common shares from the Toronto Stock Exchange and apply to securities regulatory authorities to stop issuing them, Shell Canada said.

Arc-AWE merger approved

The approval of the Arc-AWE merger paves the way for a spin-off of Arc's Canning basin assets in Western Australia into exploration vehicle Buru Energy Ltd., which is to be chaired by Arc's managing director Eric Streitberg.

Arc shares were suspended after close of trade on the Australian Stock Exchange Aug. 11 pending the merger.

Arc says the merger and the spinoff of Buru are expected to be implemented Aug. 25, with trading in Buru to begin Sept. 1 on the Australian Stock Exchange.

The new Arc-AWE entity will own a 57.5% stake in the producing Cliff Head oil field in the offshore Perth basin of Western Australia as well as a 42.5% interest in the BassGas gas-condensate project in Bass Strait to pipe gas to Victoria (based on Yolla field reserves in Tasmanian waters).

The combined portfolio also will contain AWE's share of Tui oil field off New Zealand, Casino gas field in the Otway basin off western Victoria, and Arc's onshore Perth basin oil and gas fields. ✦

Knox said he looked forward to leading Santos as it pursued its vision of becoming the leading Australian company supplying energy to Australia and Asia.

Knox joined Santos in September 2007 as executive vice-president, growth businesses. He was responsible for growth in Santos's emerging new businesses including LNG, geoscience and other new ventures, and Indonesia.

St. Mary Land & Exploration Co. has appointed **Kenneth Knott** vice-president, business development and land. He also has been appointed assistant secretary.

Knott has worked for St. Mary since 2000 and most recently held the position of land manager for the Gulf Coast region. He will be responsible for St. Mary's land administration and business development activities and will be based in the Houston office.

Other moves

BG Australia has appointed **Les Guthrie** president, LNG, to manage the company's interests in the Queensland Curtis LNG project. Guthrie will oversee planning, environmental assessment, design, and construction of the proposed LNG plant at Gladstone, about 500 km north of Brisbane, and will be responsible for its ongoing operations and growth on behalf of BG Australia and Queensland Gas Co. Ltd.

Guthrie has extensive worldwide experience in project management and was previously BG Group's general manager of projects, based in the UK, where he was responsible for project execution across the Group's global portfolio.

Oneok Inc. has named **James Wilson** as regional vice-president and **Eric A. Grundman** as vice-president, administration, at its Texas Gas Service division.

Wilson served as the director, gas supply, for TGS. He has held various accounting, managerial, and field operations positions since joining the company in 1989.

Grundman began his career with TGS in 1995 as a community affairs manager for the Austin area before becoming manager, government affairs, for TGS and Oneok in Texas. He served as manager, process improvement and quality assurance for TGS.

Abu Dhabi National Energy Co. PJSC has appointed **Frederic Lesage** to serve as managing director, TAQA North. Lesage succeeds **Tim Granger** effective Sept. 30.

With more than 17 years of industry experience, Lesage most recently served TAQA in the role of GVP, integration and optimization.

Joseph Israel has been promoted to chief operating officer of Alon USA. He previously served as vice-president, mergers and acquisitions.

Israel will be responsible for the integration and business planning of the company's refining and asphalt businesses.

Joe Concienne will assume the role of senior vice-president, refining and supply. Concienne will have operating responsibilities for all of Alon's refineries with each refinery manager reporting directly to him. He most recently served as senior vice-president of refining and transportation.

Michael Oster will become senior vice-president, M&A. He previously was general manager of commercial transactions.

CNPC to develop Ahdab oil field in Iraq

Eric Watkins
Senior Correspondent

The Iraqi Ministry of Oil, renegotiating an agreement first signed more than a decade ago, has approved arrangements that will allow state-owned China National Petroleum Co. to develop Ahdab oil field.

The agreement, which restores a project that was cancelled after the 2003 US-led invasion of Iraq, was signed by Chinese officials and Iraqi Oil Minister Hussain al-Shahristani.

Under the contract, which still requires approval of the Iraqi and Chinese governments, CNPC will provide technical advisers, oil workers, and equipment to increase production at the field, which is in Wasit province, about 160 km southeast of Baghdad.

Shahristani said the two sides agreed to renegotiated terms of a deal signed in 1997. He said the contract has been changed to a set-fee service deal from the oil production-sharing agreement signed earlier.

CNPC will help Ahdab produce 110,000 b/d, up from the originally agreed 90,000 b/d, with first output expected in 3 years. According to Shahristani, the field should have an active life of some 20 years.

Ahdab field is estimated to contain about 4.54 billion bbl of original oil in place, of which 955 million bbl is believed to be recoverable (see map, OGJ, Mar. 24, 2003, p. 43). Iraq National Oil Co. drilled four wells in Ahdab field in the late 1970s and early 1980s (OGJ, Apr. 14, 1997, p. 21).

CNPC will own 75% of the joint venture, with Iraq's state-owned Northern Oil Co. owning the remaining 25%. Shahristani said the contract, currently valued at some $3 billion, would be reviewed every quarter over its 22-year term.

Analysts saw the agreement as a breakthrough for China and CNPC over other countries and international oil companies.

Liu Youcheng, a Beijing-based analyst with Hongyuan Securities, noting that it has become more and more difficult to obtain equity and exploit rights in oil fields, said it is good for China to participate in the development through a service contract.

Alex Munton, an analyst with consultant Wood Mackenzie, said the biggest significance of the agreement is that CNPC will benefit as the first international oil company to be developing one of the giant discovered oil fields in Iraq in the new era.

According to Munton, CNPC will be the first with people on the ground and the first to develop a working relationship with Iraq's Oil Ministry.

IOC deals rejected

Iraqi oil ministry officials earlier expressed hopes of signing contracts with international oil companies by the end of June. Now, according to ministry spokespersons, those talks with such firms as Royal Dutch Shell PLC, BP PLC, and ExxonMobil Corp. are unlikely to proceed.

Last week, a top Iraqi official criticized international oil companies for trying to overcharge the war-torn nation and for ignoring what he referred to as their "humanitarian" duty to help develop Iraq's battered oil industry.

The charge came after Iraq delayed the signing of short-term oil service contracts with oil majors due to disagreements over payment terms and their duration.

"The invitations to take part in these projects have not only an economic but a humanitarian character," said Iraq's electricity minister Karim Waheed after meetings with Russian energy minister Sergei Shmatko and the heads of Russian energy service firms.

"Some companies in those cases demanded sky-high prices for their services, thinking Iraq does not have a grasp of international financial markets. They were unpleasantly surprised when they found out we fully understand global commodity markets and global stock markets," Waheed said. ✦

Woodside-led JV starts oil output from Vincent field

Oil production has started from Vincent field in the Carnarvon basin production license WA-28-L off Western Australia, reported Woodside Petroleum Ltd., the field's lead joint venture partner.

The company says that hookup, testing, and commissioning of the Maersk Ngujima-Yin floating production, storage, and offloading vessel has been completed and that the field is now on stream. The vessel has a storage capacity of 1.2 million bbl.

Initial field production is from six subsea wells and the flow rate is expected to increase steadily to 50,000 b/d within the next few weeks before a natural decline to about 40,000 b/d by yearend.

This first stage of development has cost $1 billion (Aus.).

The second stage will begin early in 2009 to bring at least two additional wells on line to maintain a steady flow.

Vincent field, discovered by Woodside in 1998, has estimated reserves of about 73 million bbl. The field lies 50 km northwest of Exmouth in 350 m of water.

Woodside, operator, holds 60% interest. Mitsui E&P Australia holds the remaining 40%. ✦

Falcon buys into PetroHunter US, Australia assets

Falcon Oil & Gas Ltd., Denver, has approved binding agreements with PetroHunter Energy Corp. to acquire shares in two PetroHunter projects in the US and Australia.

Falcon will pay $7 million for a 25% working interest in five wells in PetroHunter's 20,000-acre Buckskin Mesa unconventional gas project in Colorado's Piceance basin.

The funds will be used to complete and test the wells, and if testing is successful, Falcon has the option to acquire an additional 25% working interest in the wells and a 50% working interest in the overall Buckskin Mesa project.

The Buckskin Mesa option requires Falcon to pay an additional $18 million in spending commitments for a drilling and development program, and $25 million in cash or convertible Falcon shares. In addition, Falcon would have an option to become operator of the Buckskin Mesa project, in which case it would pay an additional $3.5 million in cash or securities convertible into Falcon shares.

Beetaloo basin

The second agreement is to acquire a 50% working interest in PetroHunter's 7-million-acre Beetaloo basin prospect in Northern Territory, Australia, for $5 million in cash and $20 million of securities convertible into Falcon shares.

PetroHunter will remain operator of the Beetaloo basin (see map, OGJ, June 27, 1994, p. 60).

The agreements, however, provide for a joint operating committee and direct involvement by Falcon managerial, technical, and financial personnel.

The transactions are subject to closing conditions and regulatory approvals, and the Buckskin Mesa transaction is subject to settlement of an outstanding PetroHunter litigation regarding the Buckskin Mesa project.

Because Marc A. Bruner, Falcon's chairman, chief executive, and president, is a major PetroHunter shareholder, the Falcon board formed a committee of independent directors to evaluate and approve the transactions.

Buckskin Mesa is in Rio Blanco County 5 miles west of Meeker, Colo. ✦

Colombia

Solana Resources Ltd., Calgary, was preparing to test the Los Aceites-1 well on the Guachiria block in Colombia's Llanos basin.

Logs, MDT tests, and sidewall cores indicated oil pay in the Carbonera C-7 formation, where the well found 40° gravity oil.

Los Aceites-1 encountered the same sand package, with better log characteristics, as in the Primavera-1 well 3.3 km north. Primavera-1 tested 650 b/d of oil from the C-7.

Solana operates the Guachiria block with 100% working interest, and Lewis Energy Colombia holds a 30% beneficial interest in the block.

Ghana

The overall capital expenditure for first phase development of Jubilee field off Ghana is estimated at $3.1 billion, excluding the cost of leasing the FPSO, said Tullow Oil PLC.

The field is to start up in 2010 with 17 producing and injection wells and facilities capable of processing more than 120,000 b/d of oil and 160 MMcfd of gas and injecting more than 230,000 b/d of water. The port of Takoradi is being upgraded to support the field's development.

Produced gas initially is to be split between reinjection to improve oil recovery and shipment to shore for power generation.

New Zealand

Cue Energy Resources Ltd., Melbourne, acquired a 20% interest in the 5,341 sq km PEP 38494 in the southern Taranaki basin of New Zealand.

Cue Energy will earn the interest under a farmout from Todd Exploration by funding 30% of the cost of the Matariki-1 well.

The block is 50 km offshore in 70-100 m of water. Besides the Matariki prospect, it contains the Paua and Pike leads.

Matariki, on the Tasman Ridge, is a four-way dip closure with exploration objectives identified at several levels that are similar to those shown to be hydrocarbon bearing in Maari field 22 km north. It is to be drilled in the second half of 2009.

Pakistan

Heritage Oil Corp., Calgary, took a farmout to earn 54% interest in and became operator of the Zamzama North block just north of 2.3 tcf Zamzama gas-condensate field in Pakistan.

Heritage was awarded a 60% interest in the Sanjawi block in Baluchistan Province near Sui and Pirkoh gas fields in November 2007. A number of oil seeps south of the license give encouragement for the existence of an oil play.

Petroleum Exploration (Pvt.) Ltd. has spud the Sadiq-2 development well on Block 22 in Pakistan's central gas basin, said 10.5% participant Jura Energy Corp., Calgary.

Target is the Sui Main limestone reservoir at 1,104 m. It is the third well drilled on the block since September 2007 following Hasan-3 and Khanpur-2, which have been on production since early 2008.

Philippines

Otto Energy Ltd., Perth, said its NorAsian Energy unit began site surveys in SC50 and 51 off the Philippines in anticipation of drilling two or three wells in the first half of 2009.

Those wells are Calauit-2 in SC50 and Argao-1 and Bahay-1 in SC51.

The surveys are expected to be complete by September 2008.

Qatar

Qatar Petroleum let a $140 million contract to CGGVeritas to shoot a large, ultrahigh-density, high resolution onshore seismic survey in Qatar.

The 40,000-channel survey will image the Dukhan field reservoir that extends under desert plains, coastal salt flats, transition zones, and shallow water. The 30-month job is to start near the end of 2008.

Romania

Sterling Resources Ltd., Calgary, has spud the Ana-2 appraisal well in the Black Sea off Romania.

The well is to appraise the December 2007 discovery at Ana-1, formerly Doina Sister. Ana-2 is to delineate Ana gas field with a 45° deviation nearly 1 km northwest of the discovery well.

Sterling is using mud line suspension technology and drilling templates for predrilling wells prior to development so that both wells will be accessible from the same platform. A template is set in 69 m of water.

Tanzania

Heritage Oil Corp., Calgary, plans to begin shooting 2D seismic on the Kimbiji and Kisangire blocks in Tanzania in September 2008. Drilling is to begin in the second half of 2009.

Heritage acquired four blocks in April 2008 in Tanzania close to the Mkuranga-1 gas discovery.

Uganda

Heritage Oil Corp., Calgary, was testing the Kingfisher-2 appraisal well on Block 3A in Uganda after it encountered 37 m of net oil pay in what appears to be the lateral equivalent of the three pay zones encountered in the Kingfisher-1 discovery well.

The deeper Kingfisher-2 target was not charged with hydrocarbons, but the company still views the basal sands as an important potential reservoir target for other prospects on Block 3A.

Heritage Oil plans to begin drilling in September on Uganda's Block 1 with an initial two to three well exploration program.

A structural trend characterized by high amplitude anomalies on seismic can be traced northward from Tullow Oil PLC's Kasamene-1 discovery well 2.5 km south of Block 1 through the Warthog, Giraffe, and Buffalo prospects on Block 1, Heritage Oil said.

Venezuela

Petroleos de Venezuela SA let a $70 million contract to SCAN Geophysical ASA, Oslo, for 3,300 sq km of 3D seismic surveys off northeastern Venezuela. The contract, SCAN's largest, is for marine seismic in the Dragon Norte area.

Gulf of Mexico

Probe Resources Ltd., The Woodlands, Tex., discovered commercial reserves in multiple horizons in its East Cameron 36 No. 1 well off Louisiana in the Gulf of Mexico.

TD is 10,450 ft. Gas production is to start in the fourth quarter of 2008, and more drilling is planned late this year.

The company also plans to spud wells in East Cameron Block 246 in August and in South Timbalier Block 214 in mid-September.

Wyoming

XXL Energy Corp., Vancouver, BC, formerly Exxel Energy Corp., completed two acreage acquisitions in the Green River basin of Wyoming.

The acquisitions include acreage contiguous with XXL holdings in the Greater Jade area northwest of Wamsutter in northeastern Sweetwater County. The lands were acquired from a public company in privately negotiated transactions.

Acreage in one transaction is in an area of mutual interest with some of XXL's partners in the basin and will be offered to them as part of a previous agreement.

After that offering, XXL will have acquired more than 7,000 net acres in the basin, its Jade position will increase to 17,000 net acres, and its overall position in the basin will increase to 35,000 net acres.

Shell installs world's deepest production spar at Perdido

Nina M. Rach
Drilling Editor

Shell Exploration & Production Co. launched the truss spar for the Perdido regional development on Aug. 8, 2008. After a 2½-day sail, it reached location at Alaminos Canyon Block 857, about 200 miles south of Freeport, Tex., about 8 miles north of the international maritime border with Mexico.

The spar was upended and attached to three of nine mooring lines (Fig. 1).

The regional spar with DVA (direct vertical access) wells is moored in about 8,000 ft of water and will gather, process, and export production from three fields: Great White, Tobago, and Silvertip, in a 15-km radius (Fig. 2).

Called the "Perdido Regional Host," it will serve as a common processing hub; the topsides will include a rig for additional drilling and completions.

There will be 22 DVA wells from the spar, with an additional eight tiebacks from subsea completions. The spar is designed to process as much as 130,000 boe/d (100,000 bo/d and 200 MMcfd of natural gas) from wet-tree production systems. Perdido is the first Gulf of Mexico spar to have hydrocarbon storage tanks for flow assurance.

Shell is the designated operator of the Perdido development and has 35% working interest in the regional spar, along with Chevron USA Inc. (37.5%) and BP Exploration & Production Inc. (27.5%).

Russell Ford, Shell's vice-president, Technical of E&P Americas, declined to provide the total estimated cost for the project but said about half the expenses are allocated for drilling and half for facilities.

This is the first development to reach production in the Lower Tertiary play in the Gulf of Mexico.

Water depths range 7,500-10,000 ft, and the seafloor topography is rugged along the Perdido Fold Belt.

The reservoirs have temperatures of 150-200° F. and pressures of 5,000-9,000 psi (OGJ, Nov. 6, 2006, p. 8). Shell says the oil gravity ranges 18-40° API. First oil is expected "around the end of the decade" said Shell, meaning yearend 2009.

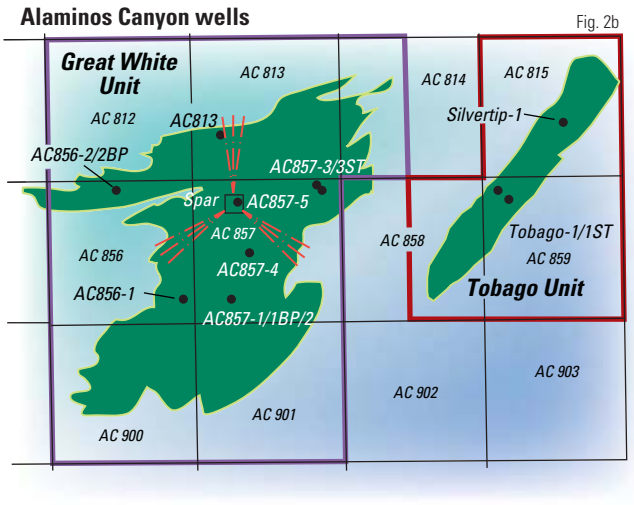
Sail-out

The Perdido spar left Kiewit's Ingleside, Tex., yard on Aug. 8, 2008, on a

Otto Candies tugs pull the Perdido truss spar through the Aransas Pass jetties on Aug. 8, 2008, en route to Alaminos Canyon Block 857 (Fig. 1; photo from Shell).

PERDIDO DEVELOPMENT

Fig. 2



morning flood tide in clear weather. The winds were light, less than 10 knots, as the spar was towed at 2-3 knots/hr through the La Quinta channel (45 ft deep) and the Corpus Christi ship channel (53-55 ft deep). The spar's diameter is 118 ft and it was ballasted to a draft of 31 ft (42 ft including the strakes).

Sailing between the Aransas Pass jetties by midmorning, it reached open water in the Gulf of Mexico.

M/V Devin Candies was the escort, with M/V Sidney Candies and M/V Kelly Candies towing from pad eyes on the top of the spar's hard tank (all three US-flagged vessels from Otto Candies LLC).

Shell's Bert Ulbricht, Perdido offshore coordination manager, told OGJ that the team planned to move the spar at 4-5 knots/hr in open water. "This is the most risky phase for the spar," said Dale Snyder, Perdido project manager.

After a 2½-day sail across 160 km, Heerema Marine Contractors upended the spar in Alaminos Canyon Block 857, rotating it to vertical from its horizontal tow position. It took about an hour for the initial flooding to get the spar within 15° of vertical but about 20 hr to pump ballast water into the spar and get it vertical.

Heerema's DCV Balder was already on location in Alaminos Canyon when the spar left Kiewit's yard. It would connect the spar to the first three moorings over 10-13 days, in order to be "storm-safe," Ulbricht said.

DCV Balder had preinstalled three polyester/chain mooring lines to seafloor anchor piles.

Shell's Curtis Lohr, responsible for conception and design of the Perdido spar, told OGJ that this is Shell's first use of a polyester mooring system on a production platform. The mooring lines have a 20-year design life. Incorporating polyester takes weight off the spar, reducing the vertical loading. This is one of the weight reductions that allowed Shell to use a smaller spar for the project. Lohr also said oil storage in the spar

Perdido regional development truss spar

Spar dimensions	555 ft (173.3 m) x 118 ft (35.97 m)
Spar draft	505 ft
Spar total displacement	186,270 kips (186 million lb_f)
Spar weight	20,956 tonnes
Mooring system	Nine taut lines (3 x 3); 9.68-in. polyester rope main section with short lengths of 5.28-in. chain at each end; 18-ft OD suction piles
Risers (6)	• Five 14-in. diameter production risers with subsea separation and boosting systems • One drilling and completion riser
Topsides dimensions	150 ft x 210 ft
Operating payload	37,000 kips (37 million lbf), including rig and equipment
Accommodation	150

Main contractors	Providing
Noble Drilling Corp.	Delineation drilling
Technip SA	Spar design, fabrication; umbilicals; mooring system
Alliance Engineering	Topsides design
Kiewit Offshore Services Ltd.	Topsides fabrication; spar completion
FMC Technologies Inc.	Subsea completion and processing systems
Oceaneering International Inc.	Oil pipeline tie-in; subsea jumpers
Heerema Marine Contractors	Offshore installation of host, subsea flowlines, and equipment
Dockwise Shipping BV	Finland to Texas spar tow
Otto Candies LLC	Gulf of Mexico spar, topside tows
American Bureau of Shipping	Certification

reduces the topsides weight, keeping it to a single lift.

The topsides will be completed and will sail out in February 2009, aboard the OC 4126, the largest US-flagged deck barge, and towed by Candies vessels. The topsides will be mated with the spar in a single lift using Heerema's DCV Thialf.

Once completed, Shell says the steel spar structure will be 882 ft from the keel to the top of the drilling derrick, nearly as tall as the Eiffel Tower.

Construction

Shell chose a spar after considering FPSO and semisubmersible designs because the project needed a stable floating platform to support a platform rig in deep water. This is the first Lower Tertiary production and the Perdido reservoirs may be difficult to produce because they are highly fractured and are low-pressure. The company anticipates that a lot of well work may be required, such as sidetracks and interventions. Shell's BC-10's FPSO in Brazil, by comparison, has no drilling and completions rig.

Shell awarded Technip SA an engineering, procurement, and construction (EPC) contract for the Perdido production spar, umbilicals, and mooring system (OGJ, Nov. 27, 2006, p. 9). The contract covered spar and mooring system design and fabrication, which was managed through Technip's operations and engineering center in Houston; load out onto the heavy transport vessel; transportation and quayside delivery to Kiewit's Gulf of Mexico yard; and design of the steel catenary risers, top tension risers, and umbilicals.

Shell's Lohr said the company ordered steel in July 2006, although the contract with Technip was not formalized until November 2006. Technip began building the spar in November 2006 at its construction yard in Pori, Finland.

The spar sailed from Finland on May 27, 2008, aboard Dockwise Shipping BV's Mighty Servant I (Fig. 3). MS1 is a 29,000-tonne, 190-m long, heavy transport vessel.

The Perdido spar sails from Finland in May 2008 in a dry lift aboard Dockwise Shipping BV's Mighty Servant I. The tops of the six risers will attach to the bottom of the spar's soft tank, shown above (Fig. 3; photo from Shell).

On June 19, after a 8,200-mile sea voyage, the spar arrived at Kiewit Offshore Services 400-acre fabrication yard in Ingleside along the La Quinta shipping channel in Corpus Christi Bay.

Shell, Technip, and Kiewit completed the final outfitting in preparation for offshore installation. This included floating the spar off the Mighty Servant I, removing the seafastenings and flotation tanks, and installing the remaining strakes, anodes, and installation aids (Fig. 4).

The Perdido spar weighs 20,956 tonnes and has a total height of 173.3 m (555 ft) and a diameter of 35.97 m (118 ft).

Kiewit began building the topsides in March 2007 and will finish by February 2009. Topsides includes production equipment, drilling rig, and living quarters for 150. Snyder told OGJ the quarters are rated as a temporary refuge with fire and blast-resistant firewalls; water and foam fire-extinguishing systems cover the entire deck.

The topsides will include an Astech aluminum helideck, designed by Houston-based Zentech Inc. and supplied to Delta Engineering Corp. The helideck has an automatic fire-suppression system and a grooved surface to carry away any flammable fluids and can accommodate two long-range Sikorsky S92 helicopters simultaneously, each capable of holding up to 24 passengers

The Perdido spar drew about 42-ft draft as it sailed through the Aransas Pass jetties (Fig. 4; photo by Nina M. Rach).

and crew. Zentech Pres. Ramesh Maini said it will be the first time this type of helideck is used in the Gulf of Mexico on a US flagged vessel.

Subsea components

Snyder told OGJ that Heerema is laying the 8-in. and 10-in. subsea flowlines using its J-lay tower on the DCV Balder. It is also installing the subsea manifolds and subsea boosting system components.

In early 2008, Technip received additional contracts for engineering, fabrication, and installation of the Perdido flowlines and risers (OGJ, Feb. 18, 2008, p. 8). The work includes 8.24 miles (13.2 km) of pipelines, which Technip will weld at its spool base in Mobile, Ala. The pipelines will be delivered and installed with Technip's Deep Blue deepwater pipelay vessel, laid to a maximum depth of 9,700 ft along the route (OGJ, Feb. 18, 2008, p. 9).

Technip also has a contract to reel-lay the 6-in. recirculation flowline from the spar to Silver Tip.

In July 2008, Shell awarded a contract to Oceaneering International Inc. to fabricate and install subsea hardware, including 29 flowline and well jumper spools, a pipeline tie-in sled, and related products. Oceaneering will begin installation later this year, using its dynamically positioned (DP) vessels, including the new Olympic Intervention IV (OI IV).

Oceaneering will perform the world's deepest (about 4,500 ft) cutting of an operating oil pipeline and splicing in a Y-connection. It will be done with ROVs and specially designed subsea tools and sleds.

Shell contracted FMC Technologies Inc. to supply the subsea completion and subsea processing systems, including 17 subsea trees (enhanced deepwater vertical trees-EVDTs) rated to 10,000 psi (69 MPa), two subsea manifolds, five subsea caisson separation and boosting systems, topside and subsea controls, and related subsea equipment.

Several new subsea technologies are being used for both BC-10 and Perdido, including subsea separation with electric submersible pumps, electrical umbilicals, and new subsea trees. The EVDTs are 5-in. by 2-in. pressure control systems with concentric production bores and retrievable choke modules with multiphase flowmeter capability.

Spars

Spars, tension-leg platforms, and semisubmersibles are all potential platforms for deepwater developments. Spars are distinct from semisubs and TLPs in that the center of gravity of a spar is always lower than the center of buoyancy, which guarantees a positive gravitational moment, making it very stable. Spars also have a different motion-control mechanism.

Spars derive no stability from their mooring systems and should not list or capsize even when completely disconnected from the moorings.

The earliest spar design had a solid caisson hull, exemplified by Neptune (1997), Genesis (1999), and Hoover-Diana (2000).

This evolved into the truss spar by replacing the lower section of the caisson hull with a truss, beginning in 2002 with spars for Boomvang, Nansen, and Horn Mountain, and followed by nine others, 2003-06.

Kikeh was the first spar installed outside the Gulf of Mexico; Murphy Oil Corp. installed it off Malaysia in 2007. Anadarko installed a cell spar on Red Hawk in 2004, in 5,300 ft water depth.

Perdido is now the world's deepest spar installation, at 8,000 ft, 2,200 ft deeper than any other spar.

Perdido discoveries

Through July 2008, nine exploration and appraisal wells have been drilled at Great White, Tobago, and Silvertip fields.

Great White—Shell, Chevron, and BP acquired six Alaminos Canyon blocks (813, 814, 857, 858, 900, and 901) for $9.4 million in OCS Lease Sales 161 and 171 in 1996 and 1998. Great White's ownership is Shell (33.34%), Chevron (33.33%), and BP (33.33%).

Great White field was the first of the three fields discovered, in 8,009 ft of water on Alaminos Canyon Block 857.

Shell and its JV partners used Transocean Sedco Forex's Deepwater Nautilus semisubmersible to drill the Great White discovery well to 19,907 ft TVD, Mar. 6-May 18, 2002 (OGJ, Oct. 14, 2002, p. 8). At the time, Shell said that further drilling was required to determine commerciality.

Tobago—Unocal Corp. discovered Tobago field at Alaminos Canyon 859 in 2004, when it drilled the discovery well to 18,510 ft TD and a sidetrack to 18,425 ft, in 9,600 ft of water, at a cost of $25 million. The well had 50 ft of net pay in sandstone and was temporarily plugged (OGJ, May 10, 2004, p. 8).

At the time, Unocal had 40.01%, Shell had 30%, Chevron 16.66%, and Nexen 13.33% of Tobago (OGJ, May 10, 2004, p. 8). Tobago is now operated by Shell (32.5%) on behalf of Chevron (57.5%) and Nexen (10%; OGJ, Nov. 6, 2006, p. 8).

Silvertip—Chevron made the Silvertip discovery on Alaminos Canyon Block 815, drilling to 14,778 ft TD in 9,200 ft of water in August 2004. Chevron holds 60% and Shell 40% (OGJ, Nov. 6, 2006, p. 8).

The Perdido front-end engineering and design (FEED) started in November 2005, Snyder said. Shell did the overall FEED and managed the detailed design and construction.

In 2005, Shell signed a 2-year contract for the Noble Clyde Boudreaux semisubmersible to predrill some of the Perdido wells, starting mid-2007. The rig has dual derricks, is drilling the topholes for all 22 wells ("batch setting"), and has predrilled 8 of the wells to speed up initial production. Shell's Ford said there is no dynamic annular pressure control—Noble is drilling at original pressure. Total depth is about 7,500 ft below the mud line.

Production

Shell designed the flowlines for Perdido at 8-in. and 10-in. nominal diameter. All flowlines except the water injection lines will be insulated. None will be heated. Production will flow to two export pipelines, requiring about 179 miles of new pipe.

Oil from Perdido will flow to Exxon's Diana-Hoover (HOOPS) pipeline, about 70 miles away. Snyder told OGJ that adding 100,000 bo/d from Perdido will "more than double the flow" through the 18-in. diameter pipeline.

Gas will flow to the Boomvang system, more than 100 miles away. Heerema began installing the flowline tie-ins in June. The pipeline end termination (PLET) at Tobago was set in 9,600 ft of water, the deepest subsea PLET in the world.

Because of the water depth, Shell has worked on controlling hydrates. Snyder said subsea separation and boosting should take care of it, although the company will also use chemicals and will have dead oil stored in the spar that can be circulated, when necessary.

Project experience

Perdido is one of Shell's top three deepwater projects; the others are its BC-10 development in the northern Campos basin off Espirito Santo state, Brazil (OGJ, May 5, 2008, p. 53) and Gumusut-Kakap oil field in Block J off Sabah, Malaysia.

Many of the Shell engineers on the Perdido project team have worked together on the company's deepwater projects as far back as the Auger TLP project (Garden Banks Block 426).

Perdido is the latest of Shell's deepwater developments in the Gulf of Mexico, including Mars, Ram-Powell, NaKika, and Ursa-Princess. ✦

Field evaluations verify VOC emission control options

Ray McKaskle
Kevin Fisher
Katherine Searcy
Trimeric Corp.
Buda, Tex.

Curtis Rueter
Noble Energy Inc.
Denver

VOC EMISSIONS—2 (Conclusion)

Field evaluations quantified the benefits and costs of various alternatives for complying with government regulations for controlling volatile organic compound (VOC) emissions in Colorado.

This concluding part of a two-part series describes field evaluations Noble Energy Inc. ran in its operated oil and gas production facilities in Northern Colorado. Part 1 (OGJ, Aug. 25, 2008, p. 37) discussed the regulations, typical operations, and study objectives.

The study evaluated several types of separators, control systems, and identified multiple cost-effective ways to meet the regulatory requirements and tailor them to site-specific factors. The field evaluation included:

- Comparing VGR, dual coil, and HLP separators. Part 1 contains schematic diagrams and descriptions of all three separators.
- Evaluating enclosed flare designs.
- Testing surge bottles and slug catchers.
- Testing vapor-recovery units.

Separator comparison

Noble began its field evaluation of the three separator configurations (VGR, dual coil, and HLP) in December 2006. Its objective was to determine the performance differences among the separators in terms of emission controls, fuel consumption, and economics. The company then used these results to select separators for installation at new production sites.

Side-by-side tests of dual coil and VGR separators, both with and without wells on plunger lift, began in February 2007.

The evaluations involved daily collection of process data and recording them manually in field data sheets. Table 1 summarizes the data collection methods and frequency.

Also collected were hydrocarbon stream samples for analysis. The evaluation analyzed the periodic grab samples of separator liquids, sales gas, sales oil, and flared gas for hydrocarbon composition during each test run, which generally lasted about 1 week. The analysis also measured the heating value of the gas samples.

Controlling the conditions in each separator for comparing performance among separators was the biggest challenge encountered in the field testing. It was impossible to test each separator simultaneously with the same feed stream. Instead, the evaluation required testing the separators in sequence and considering the effects of well production rates in interpreting the oil and sales-gas production data from each separator. For example, the production from a well tends to decline over time, so that the interpretation required normalizing the production rate from each separator to a common well production rate.

Production rate variability was a problem because it limited measurement accuracy. For example, daily tank-gauged oil production rates are subject to many variables and generally cannot accurately differentiate the small variations in production rates between separators. Finally, the extreme cold weather in early 2007 created problems such as condensation in vapor lines that interfered with dry-gas meters and freezing liquids that plugged production and sales gas lines.

Field data showed that the VGR separator substantially reduced the flared gas, as determined from gas meter measurements and the percent of feed hydrocarbons in the sales gas or sales oil streams not burned as fuel gas or flared. The VGR also burns some flash gas as fuel, thereby reducing the need for using sales gas as fuel. In addition, the VGR reduced the VOC emissions flared.

In evaluating VOC control, the field tests also verified separator economics to ensure that they did not adversely affect overall production revenues, for example by shifting hydrocarbons from oil sales to lower value gas sales.

Raw field test data showed that in the first test, the VGR generated less sales oil and gas revenue than the dual-coil separator, but in the second test, the VGR provided more revenue. The oil and gas production rates from all wells were the dominant factor for these results.

After normalizing field data on a per pound of hydrocarbon produced by all wells, the evaluation found that the VGR generated 1.0% less revenue than the dual coil in the first field test and 0.8% more revenue in the

DATA ACQUISITION MATRIX Table 1

Process data	Measurement method	Frequency
Oil production rate	Manual gauging of oil tanks	1-2 times daily
Sales gas rate	Sales gas flowmeter	Continuously measured and logged
Fuel gas consumption	Dry gas meter	Logged daily
Waste gas to burner	Dry gas meter	Logged daily
Gas sent to flare	Dry gas meter	Logged daily
Various process temperatures and pressures	From local temperature and pressure indicators on the separator.	Logged daily

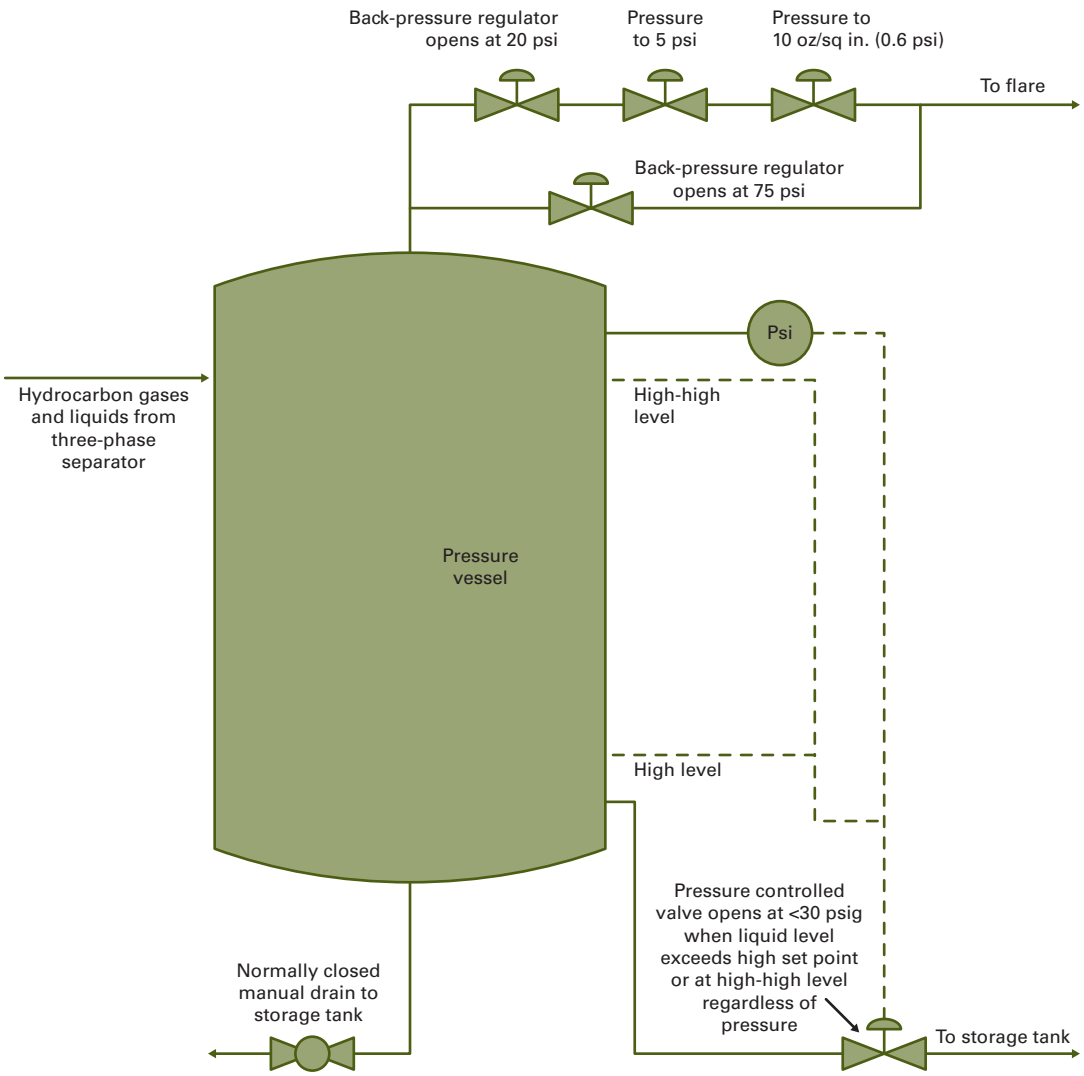
second test. The differences in the nonnormalized oil production rates for both tests and in the nonnormalized gas production rates in the first test had less than 95% confidence intervals for the difference in population means, so that these differences were not statistically significant.

In conclusion, field data showed that any differences in the economic performance were too small to determine directly in the field. Additional conclusions were:

- In both field tests, the VGR provided more produced hydrocarbons for sale as oil or gas. On a mass basis, the VGR averaged 99.1% of hydrocarbons sold as oil or gas compared with 98.4% with the dual coil.
- In both field tests, the VGR reduced the gas generated in the storage tank and sent to the flare by about 1.0 Mscfd (43%).
- In both field tests, the VGR reduced fuel consumption by about 0.7 Mscfd (71%).
- Analytical samples collected during the evaluation showed no significant difference in sales gas or oil composition between the VGR and the dual coil.
- The VGR produced slightly richer heating value (4.5%) flare gas on average, but individual samples varied greatly.

SURGE BOTTLE

Fig. 1



- The VGR and dual-core separators had no major operational problems during the field evaluation.

Enclosed flare

The common use of burners or enclosed flares is to control storage-tank vapor emissions at sites with low production, such as those producing less than 10 bo/d.

Noble's Weld County, Colo., production sites have more than 700 20-in. diameter burners installed.

Burner capacity limitations may require installation of multiple units at sites with wells producing at higher rates, so that this study evaluated the development of cost-effective larger capacity burners, as well as development of a surge bottle for extending the capacity of the 20-in. burner by reducing peak flow rates.

A typical 20-in. burner has an estimated 14.0 Mscfd capacity at 1 psig inlet pressure. If flash-gas peak rates exceed this rate for more than 1-2 min, pressure builds on the storage tanks and eventually pressure relief valves may vent gas directly to the atmosphere.

Extensive testing of a larger 36-in. diameter burner took place during February and March 2007. This prototype burner initially had problems with severe vibration at certain inlet pres-

sures during oil production cycles. One problem was with visible smoke.

Vibration or fluttering indicates flame instability at the burner tips. A shortage of air causes the flame alternately to burn and extinguish in rapid pulses and may cause this instability. A combustion expert who witnessed the field tests recommended installation of commercially available venturi burner tips and other changes for getting more air into the burner.

The challenge was to get enough air to mix with very rich gas that is at or near its dewpoint. The problem was even more difficult to solve in this application because the inlet gas did not have sufficient pressure to use as a driving force to draw in air to mix with the gas. In addition, the test site did not have the electricity needed for running an air blower. The recommended changes likely would have cost more than allowed by the project goals.

Field tests of this 36-in. diameter, 8-ft high surge bottle determined maximum oil production that the vessel could handle during a production cycle (Fig. 2).

Shortly after testing the 36-in. burner, the company identified the availability for testing of a 48-in. diameter, enclosed-flare demonstration unit. Given the minimal costs to the project for testing the larger burner, its immediate availability, and its potential to process more gas because of the larger diameter, the project team moved forward with the test. Fig. 4 in Part 1 shows the 48-in. burner.

Testing began in March 2007. The first tests revealed several problems. First, the 48-in. burner vibrated, although not as severely as the 36-in. burner. Second, the stack temperatures exceeded acceptable temperatures for the galvanized stacks used on the burners. In effect, the burner configuration released too much heat for this size of enclosed flare.

This burner requires careful management of the gas rate and heat release to prevent overloading the unit. In addition, the burner occasionally vented faint visible smoke at low inlet pressures, which most likely may occur at either startup or shutdown of an operational cycle and is not acceptable from an air quality perspective.

The vendor made several modifications to address these problems and delivered a revised prototype later in March 2007. The modifications included a reconfigured manifold to reduce the maximum firing rate and a refractory blanket lining inside the galvanized metal stack. These modifications provided the required temperature protection for maximum firing rates with metal galvanized stacks while keeping unit costs lower than alternative solutions such as stainless steel or stainless steel-lined carbon steel stacks.

The refractory blanket design had the drawback that any gaps in it could lead to a failure of the galvanized metal stack. To address this concern, the design specified a minimum 1-in. overlap at each heat blanket seam to protect the metal outside the heat blanket. The reconfigured burner manifold and the refractory liner addressed the high-temperature problems. Later units changed to refractory blanket-lined carbon steel stacks as a more economical steel stack supplier was identified.

To address the vibration problems, the vendor placed spring-loaded valves in the burner manifolds to limit flow to a number of burner manifolds that is proportional to the inlet pressure and inlet flow rate to the flare. Coupled with adjustments to damper settings on the air intakes, these changes effectively solved the vibration problems.

The best solution identified for the smoking problem was installation of a regulating valve that only allows vapors to flow from the storage tank to the flare after the vapors reach a minimum pressure. Tests determined the optimum check valve and check-valve orientation for obtaining this pressure.

Surge bottles, slug catcher

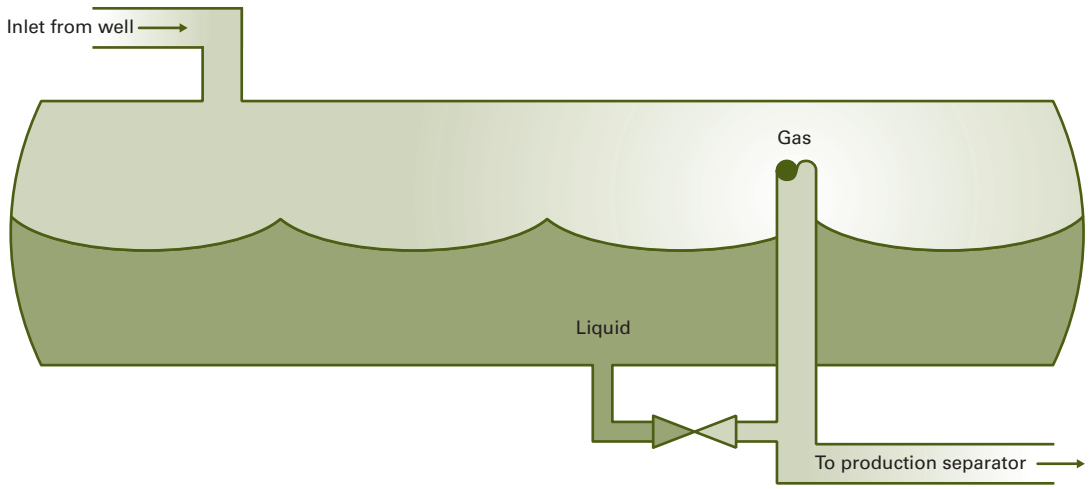
As described previously, wells at many of Noble's sites flow intermittently with the aid of wellbore plunger lift. Fluctuations in the fluid delivery rate to the separation equipment present an additional difficulty for controlling

emissions because the equipment design needs to address both the peak as well as average flow rates.

Several strategies may mitigate the negative effects of flow variations on flashing losses. For example, one may install a slug catcher between the well and separation equipment or a surge bottle with appropriate controls between the separation equipment and atmospheric storage tanks.

SLUG CATCHER

Fig. 3



The slug catchers and surge bottles provide a buffer for the separation and control equipment and reduce capital costs in cases where the separation and control equipment cannot otherwise handle the peak flow rate.

Surge bottle tests

At many Noble production sites, flow rates cycle as low volume wells with plungers go on and off line. The fluctuation in feed flow rates makes separation equipment operations more difficult.

Adding a vertical pressure vessel, such as a surge bottle (Fig. 1), between upstream separation equipment and the atmospheric storage tank can reduce the amount of vent gas to be treated and thus reduce the size and cost of the downstream control equipment, for example the flare.

The surge bottle also provides additional oil revenue because a greater portion of the hydrocarbon feed remains in the liquid phase.

Liquids and gases from upstream separation equipment enter the pressure vessel. Liquids and gases accumulate in the pressure vessel during the well cycle. Once pressure in the surge bottle exceeds a predetermined high-pressure set point, vapors from the pressure vessel flow through a control valve at a controlled rate until the vessel's pressure decreases to a predetermined low-pressure set point. At the set point, the control valve stops the flow.

Liquids produced during a well cycle remain in the surge bottle while pressure in the vessel decreases as a control valve allows the gas to vent. This prevents high-pressure liquid from flashing to the storage tank, which results in a lower peak rate and less vapors formed during the cycle in the storage tank. Additionally, the oil production rate increases because more hydrocarbons remain in the liquid phase and a decreased vent-gas volume strips out less heavier hydrocarbons.

Control valves prevent liquid discharge from the surge bottle unless the pressure decreases below a predetermined set point. The control set up maintains a liquid seal in the bottom of the vessel that prevents vapors at the bottom of the vessel from going to the storage tank. For liquids to drain from the surge bottle to the storage tank under normal operating conditions requires a liquid level in the surge bottle greater than the level set point and a pressure in the surge bottle lower than the pressure set point.

When the liquid reaches the high-high liquid level in the bottle, a second, high-high level control setting allows the liquids to drain from the bottle to the storage tank regardless of pressure in the bottle. This prevents the surge bottle from overfilling with liquid.

Pressure controls that allow vapor and liquid to leave the surge bottle must operate at set points about 10 psi apart; therefore, an operator must select settings carefully to obtain full benefits from the surge bottle.

Field testing of prototype surge bottles modified from existing pressure vessels showed that the surge bottle capacity must hold the entire production volume from a given well cycle for best performance in reducing or preventing venting from the storage tank. Additionally, the flare must bleed pressure off the surge bottle before the surge bottle fills full of liquid and before the pressure exceeds the back-pressure relief valve set-point pressure.

The field testing optimized the control system (Fig. 1) for maximum performance with simple controls that are readily available in oil field service supply shops. These controls allow for a fail-safe operation in the event that the feed exceeds the surge-bottle capacity.

As with other oil field service equipment in these locations, the surge bottle design allows for unattended operation and does not require electricity. The volume of the surge bottle limits the oil production peak rate that the

bottle can handle effectively. Transportation, installation, and servicing requirements determine the practical limitations for the surge bottle size.

Repeated field tests of the 36-in. diameter, 8-ft seam-to-seam high surge bottle (Fig. 2) showed that 2.5-3.0 bbl/well cycle (15-30 min) was the maximum oil production that the vessel could contain successfully without exceeding the set point that relieves gas pressure in the surge bottle to the storage tank.

Variation in well cycle production rates were the main cause for changes in the capacity of the surge bottle. Control tests showed that use of the surge bottle reduced the vapor formation peak rates.

Personnel will test this prototype slug catcher when oil production peak rates at the site decrease to about 1 bbl/cycle (Fig. 4).

Trimeric estimated with simulations the amount of oil per cycle that the surge bottle could hold and found good agreement with the field data. The simulations predicted the effect of operating temperature, flare capacity, duration of oil production per cycle and composition of gas remaining in the surge bottle from the previous cycle on the capacity of the surge bottle. As shown in Table 2, the base case showed that the surge bottle could hold 2.7 bbl/well cycle that lasted for 30 min. Varying conditions studied in the simulations gave a range of 2.0-4.1 bbl/well cycle as the maximum surge bottle capacity.

Process simulations also estimated the economics of using a surge bottle. In addition to allowing the sizing of VOC emission control devices for smaller peak gas flows, the surge vessel also increases oil production.

Trimeric ran process simulations for three field test sites to estimate the economics of the incremental oil production resulting from the surge vessel. The simulations were for several feed compositions both with and without a surge bottle between the separation equipment and the atmospheric storage tank. As with other simulations, Trimeric used WinSim Design II v.9.43 and the Peng Robinson equation of state as the thermodynamic model.

For the three sites, the simulation indicated that oil production would improve by 2-3% and result in short economic payback periods of 1 year or less.

Slug catcher tests

Another method for reducing peak flows and associated design requirements for VOC control employs a slug catcher upstream of the separators. Early in 2007, Trimeric and Noble engineers began discussing the concept and preparing engineering drawings for a slug-catcher prototype. The prototype slug catcher is essentially a horizontal pipe sized to collect the volume of the maximum slug size. The designed prototype has a 1-bbl liquid slug capacity (Fig 3).

Produced oil, water, and gas enter one end of the slug catcher and gravity separates out the liquid and gas. Gas flows out into the exit pipe while liquids remain in the slug catcher. An external control valve lets the liquids drain slowly into the separator to reduce liquid surging, thereby reducing the flash-gas peak rate.

The study had a prototype slug catcher fabricated and delivered to a test site in August 2007; however, it delayed plans for testing the slug catcher to allow accelerated testing and development of the surge bottle.

A potential drawback of the slug catcher is a high cost because the slug catcher must have a rating based on the high-pressure inlet conditions and requires a flanged end for maintenance access. The slug catcher also is upstream of the inlet three-phase separator, so that water freezing during cold weather may cause operational problems that could lead to additional costs for insulation

BOTTLE CAPACITY

Table 2

Case No., Description	Flash and surge temperature, °F.	Gas to burner, Mscfd	Surge duration, min	Gas composition in surge bottle at cycle start	Surge volume, bbl
1. Base	100	10.4	30	60% C_1, 30% C_2, 10% C_3	2.7
2. Higher temperature	120	10.4	30	60% C_1, 30% C_2, 10% C_3	2.0
3. 20% higher burner rate	100	12.48	30	60% C_1, 30% C_2, 10% C_3	3.4
4. 20% slower duration of surge	100	10.4	36	60% C_1, 30% C_2, 10% C_3	3.4
5. 20% lower burner rate	100	8.3	30	60% C_1, 30% C_2, 10% C_3	2.0
6. 20% faster duration of surge	100	10.4	24	60% C_1, 30% C_2, 10% C_3	2.0
7. Initial bottle composition—methane	100	10.4	30	100% C_1	2.2
8. Initial bottle composition—propane	100	10.4	30	100% C_3	4.1

and heat tracing. One key benefit of the slug catcher is that the controls are very simple.

Fig. 4 shows the prototype slug catcher, installed at a site with a current peak production rate of 2-3 bbl/well cycle. This rate is too high for testing the 1-bbl capacity slug catcher. Project personnel are monitoring the natural production decline at the site and testing is planned when the peak production rate drops to about 1 bbl/cycle.

Vapor recovery unit tests

The study evaluated two vapor-recovery systems in detail.

The first (Fig. 5 in Part 1) was a packaged two-stage reciprocating compressor. In the initial installation configuration, all low-pressure gas from the low-pressure separator of the HLP flashed to the storage tank and all vapors from the storage tank entered Stage 1 of the VRU. Noble has more than 100 of these units in service at its Weld County production facilities. The study's goal was to increase the throughput capacity of these VRUs.

The goal was met by installing a surge bottle and sending vapors from the surge bottle directly to the second stage of the compressor. This reduced the load on the first stage in two ways. First, the low-pressure gas from the HLP that would have gone to the storage tank and then to Stage 1 now went from the surge bottle directly to Stage 2. Secondly, lower pressure liquid drained from the surge bottle to the storage tank, so that flashing the oil to the storage tank generated fewer vapors.

The peak flow capacity of the VRU increased from 17 Mscfd in the original configuration to 32 Mscfd with the surge bottle online and the surge bottle vapor routed directly to Stage 2 of the VRU.

Interestingly, the average amount of cumulative vapors collected by the VRU in 24 hr decreased to 6.0 Mscfd with the surge bottle online from 7.5 Mscfd in the original configuration. The reduction in gas recovered with the surge bottle online indirectly confirms that the oil production rate increases with the surge bottle, as would be expected by adding an additional stage of pressure drop for flashing oil down to atmospheric pressure.

The second VRU evaluated in the project was a packaged unit that was integrated with a three-phase separator with two stages of pressure drop (Fig. 6 in Part 1).

The VRU portion of the unit had a single-stage compressor with two separate sources contributing to its inlet low-pressure gas. The first source was vapor from the low-pressure separator. In fact, this system had a design for handling vapors from multiple two-stage separators so that gas from other low-pressure separators at the site could route to the single VRU at the site. This approach improves the potential economic performance and payback period for the system.

The other feed stream to the compressor was the storage-tank vapors after an eductor that used glycol as the motive fluid raised the vapor pressure from near atmospheric pressure (<1 psig) to about 25 psig.

This VRU was more complex than the first VRU and other VOC control equipment evaluated in this study. The testing encountered an unacceptable number of system failures and reliability problems with the two systems of this type evaluated for several months.

The manufacturer continues to develop and commercialize this system. This VRU system could have favorable economics if the system attains acceptable reliability and if the operation can ensure a favorable gas price and the ability to sell the rich gas recovered by the VRU on a per-btu basis instead of on a per-volume basis.

The most optimal scenarios indicate possible payback periods of less than 1 year. ✦

Study predicts viscosity of gas oils, heavy blends

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A recent study used various gas oils and blends with residual heavy oils in order to evaluate the predictability of four different correlations. The gas oils differed substantially in their distillation range (T50 between 208° C. and 443° C.) and hydrocarbon composition (aromatics between 21% and 87%).

We found that one viscosity test at an arbitrary temperature and Singh's correlation can predict a gas oil's viscosity in the temperature range of 20-80° C. This correlation, along with that of the linear programming tool RPMS, can optimize the blending process during production of residual fuel oil in a refinery.

Correlations

Regardless of a worldwide trend towards higher-severity modes of operation in residue conversion units and decreased production of unconverted residual oils, refiners still need to blend them with lower-molecular-weight streams (cutter stocks) to meet viscosity specifications.

Typically, primary or secondary middle distillate fractions are used as cutter stocks. The addition of higher-value materials to unconverted residual oils from residue-conversion units requires optimization of the blending process—minimization of the amount of higher-value diluent—while still meeting fuel-oil specifications.

An earlier study showed that a model predicting fuel oil viscosity with information about viscosity of the residue and cutter stock, 50% distillation point, and density can optimize the blending process during production of residual fuel oil.[1]

Antonchenkov pointed out that the biggest difficulties occurred when during estimates of viscosity of residual and middle distillate fractions whose specifications are related to different temperatures.[2] The residual fuel oil viscosity specification, for example, is related to a temperature of 80° C., whereas that of diesel oil is related to 20° C.

Singh, et al., developed a correlation that predicts viscosity of unrefined bitumen and heavy oils.[3] Equations 1 and 2 in the attached equation box show Singh's correlation.

We tested this correlation using four residual heavy oils obtained from the Lukoil Neftochim Bulgaria (LNB) vacuum distillation and visbreaking units.

Table 1 shows measured and calculated values of the viscosity of the virgin vacuum residues and unconverted visbreaker vacuum residues. From these data and those reported in Reference 1, we concluded that Singh's correlation for heavy oils predicts quite well the viscosity of virgin and secondary vacuum residual fractions at any temperature on the basis of one viscosity test at an arbitrary temperature.

These data also indicate that Singh's correlation is valid not only for unrefined bitumen but also for refined residual oils.

Honeywell Process Solutions' linear programming tool Refinery and Petrochemical Modeling System (RPMS) pre-

EQUATION 1 PERFORMANCE Table 1

Measurement temperature, °C.	Viscosity, Pa-sec — Measured	Viscosity, Pa-sec — Estimated
Virgin vacuum residue 1		
80	6.333	
90	2.727	2.751
100	1.303	1.320
110	0.727	0.689
120	0.424	0.387
Virgin vacuum residue 2		
80	1.697	
90	0.879	0.837
100	0.485	0.449
110	0.272	0.259
120	0.152	0.159
Visbreaker residue 1		
130	1.053	
150	0.269	0.346
170	0.115	0.142
Visbreaker residue 2		
130	1.536	
150	0.434	0.475
170	0.176	0.185

dicts the viscosity of blends of heavy oils and lower-molecular-weight oils using Equations 3 and 4.[4]

We tested this correlation in the LNB research laboratory using five blends containing mixtures of:

- Visbreaker residue.
- FCC light cycle oil (LCO).
- FCC heavy cycle oil (HCO).
- FCC slurry oil.
- Straight-run gas oil (SRGO).
- Atmospheric gas oil (AGO).
- Light vacuum gas oil (LVGO).

Table 2 shows the viscosities measured at 80° C. and estimated with the RPMS correlation. These data show that Equations 3 and 4 are accurate for predicting the viscosity of blends at 50° C. and also at 80° C.

We concluded that the prediction of viscosity of residual fuel oils needs only data of viscosity of the residue and cutter stocks at the temperature of the fuel-oil specification.

The aim of our study, therefore, was to investigate the different possibilities to predict viscosity of straight-run and secondary gas oils used as feasible cutter stocks.

Equations

$$(\log(\mu) + C)/((\log(\mu_0) + C) = (T_0/T)^s \quad (1)$$

$$S = 0.0066940*\log(\mu_0) + 3.5565 \text{ when } T_0 = 303.15 \text{ K (30° C.)} \quad (2)$$

$$VBI = 41.10743 - 49.08258 * \log(\log(CST + 0.8)) \quad (3)$$

$$CST = 10 \wedge (10 \wedge (41.10743 - VBI) / 49.08258) - 0.8 \quad (4)$$

$$(\log(\nu) + C)/((\log(\nu_0) + C) = (T_0/T)^s \quad (5)$$

$$S = 0.28008* \log(\nu_0) + 1.8616 \text{ when } T_0 \text{ is } 310.93 \text{ K (100° F.)} \quad (6)$$

$$\nu = A*A[\exp(B/T)] \quad (7)$$

$$\ln(B) = 4.17 + 0.00526*T_b \quad (8)$$

$$A*10^6 = [91.836* T_b^{-0.175} - 29.263]/[UOPK/T] \quad (9)$$

$$\mu = \exp[A + B/T + C\ln T + DT^E] \quad (10)$$

$$\nu = \mu/d \quad (11)$$

$$a = 0.13651 + 0.04284*n_{d20} + 0.00005*M_w + 0.00033*S - 0.00234*C + 0.00354*C/H - 0.00004*m - 0.02721*d \quad (12)$$

$$b = 47.03421 + 43.34390*n_{d20} + 0.01646*M_w - 0.47893*S - 1.24079*C + 0.84108*C/H - 0.04693*m - 10.92859*d \quad (13)$$

$$M_w = 0.01077*(BP)^{[1.52869+0.06486*\ln(BP/(1,078-TBP))]}/d \quad (14)$$

$$C \text{ (Equations 12 and 13)} = 100 - S - H \quad (15)$$

$$H = 30.346 - 65.341\ n_{d20}/d + 82.952/d - 306/M_w \quad (16)$$

$$m = M_w(n_{d20} - 1.4750) \quad (17)$$

$$\nu = b*\log_{10}T^a \quad (18)$$

Nomenclature

A, B, C, D, E (Equation 10)	=	DIPPR coefficients for liquid viscosity
BP	=	50% distillation temperature, K
C (Equation 1)	=	3.0020 when the log base is 10
C (Equation 5)	=	0.86960 when the log base is 10
CST	=	Kinematic viscosity at 50° C., cst
d (Equation 11)	=	Density at temperature T, g/cu cm
d (Equations 12-16)	=	Specific gravity at 20° C.
n_{d20}	=	Refraction at 20° C.
S	=	Sulfur, wt %
T	=	Temperature, K
T_b	=	50% distillation temperature, K
T_0 (Equations 1 and 2)	=	303.15 K
UOPK	=	UOP characterization parameter
VBI	=	viscosity blending index

Greek letters

μ	=	Absolute viscosity, Pa-sec
ν	=	Kinematic viscosity, cst
ν_0	=	Kinematic viscosity at T_0, cst

Performance of Equations 3, 4

Table 2

Blend	Components, % Visbreaker residue	HCO	FCC slurry	SRGO	AGO	HVGO	Density at 15° C., g/cc	Viscosity at 80° C., cst Measured	Calculated	Relative deviation, %
1	88.0	7.2	4.8	0.0	0.0	0.0	1.0007	111	112	1.3
2	83.0	6.8	4.5	5.7	0.0	0.0	0.9960	72	75	5.0
3	80.7	6.6	4.4	8.3	0.0	0.0	0.9910	64	64	0.0
4	80.0	6.6	4.3	0.0	9.1	0.0	0.9910	65	73	12.5
5	74.8	6.1	4.0	0.0	0.0	15.1	0.9910	71	74	4.1

Experimental

We investigated 16 gas oils from the atmospheric distillation, FCC, and visbreaker units in the LNB refinery. Table 3 shows the physical and chemical properties.

For this data set, we found that all viscosity-temperature dependencies obeyed the expression: $\log_{10}\nu = -a*T + b$. The correlation coefficient, r^2, of this expression for all the studied gas oils was 0.99. Table 3 includes the values of coefficients a and b.

We measured the viscosity of all the gas oils according to ASTM-D 445. We analyzed the overall hydrocarbon composition of the middle distillates SRGO1, SRGO2 SRGO3, LCO, HCO, and LVGO according to EN 12916.

We analyzed the hydrocarbon composition of the middle distillates VBGO1, VBGO2, and VBGO3 according to ASTM D-1319 (FIA method). We used a method developed in the LNB research laboratory to analyze the hydrocarbon composition of the heavy gas oils: FCC slurry, HVGO, and HTVGO.[5]

The selection criteria for the gas oils in our study were based on the distillation range and hydrocarbon composition. Data in Table 3 indicate that the gas oils substantially differed in their distillation and hydrocarbon composition.

The 50% distillation point varied in

GAS OIL PROPERTIES

Table 3

Property	SRGO 1	SRGO 2	SRGO 3	LCO	HCO	LVGO	VBGO 1	VBGO 2	VBGO 3	HVGO 1	HVGO 2	FCC slurry 1	FCC slurry 2	FCC slurry 3	HTVGO 1	HTVGO 2
Density at 20° C., g/cc	0.8008	0.8266	0.8533	0.9420	0.9920	0.8757	0.8301	0.8412	0.8575	0.9189	0.9186	1.0490	0.9862	1.0726	0.8901	0.8863
Distillation ASTM D-2887, °C.																
IBP	84	114	183	139	198	196	80	92	99	314	250	206	178	196	298	287
5%	141	194	244	189	248	247	151	174	199	349	362	262	200	296	346	342
10%	163	213	260	206	257	263	164	187	213	365	380	278	214	321	364	360
30%	194	238	288	230	287	297	205	223	246	409	409	324	267	359	403	400
50%	208	254	309	251	309	317	243	260	282	443	437	366	325	386	433	429
70%	222	267	331	269	331	337	282	301	324	478	467	404	371	417	464	461
90%	243	287	361	294	362	363	331	359	389	517	503	459	426	469	506	504
95%	253	297	373	304	378	375	352	388	420	529	524	483	452	493	521	520
FBP	273	327	402	339	416	406	400	457	494	543	544	533	504	538	542	541
Molecular weight[1]	155	185	227	160	195	229	176	187	201	363	354	233	210	248	359	356
Sulfur, %	0.2	0.4	0.85	0.05	0.2	1.2	1.2	1.2	1.2	1.6	1.6	0.3	0.3	0.3	0.08	0.08
Refraction, n_{d20}	1.4463	1.4612	1.4755	1.5533	1.5883	1.4891	1.4656	1.4651	1.4792	1.5184	1.5138	1.6248	1.5783	1.6511	1.5007	1.500
Hydrogen, %[2]	13.9	13.5	13.2	8.7	7.8	12.6	13.2	13.5	13.7	11.8	12.1	6.9	8.4	5.9	12.5	12.5
Temperature, °C.	**Viscosity, sq mm/sec**															
20	1.8	3.25	8.45	3.08	11.07	10.43	2.75	3.95	5.72				22.47			
30	1.52	2.62	6.11	2.49	8.25	7.49	2.29	3.18	4.36							
40	1.32	2.16	4.71	2.01	5.46	5.62	1.87	2.63	3.48	44.29	64.3	107.77	9.56	194		
50	1.16	1.84	3.75	1.71	4.46	4.36	1.60	2.16	2.82	25.67	37.48	46.3		85.14	28.81	25.59
60	1.03	1.58	3.05	1.45	3.29	3.47	1.40	1.78	2.35	16.00	24.42	29.80		44.83	19.58	17.68
70								1.54		10.78	17.03	20.01		25.62	14.07	13.51
80								1.37		7.75	12.39	14.52	3.56	16.18	10.41	9.57
Composition, %																
Saturates	79.0	73.4	71.0	13.0	19.2	64.0	40.0				51.0	14.4			59.0	
Mono-aromatics	15.0	18.1	17.2	36.0	27.8	20.3	28.0				18.0	0.8			22.4	
Poly-aromatics	6.0	8.5	11.8	51.0	53.0	15.7					29.0	80.8			17.9	
Olefins							32.0									
Resins											2.0	3.2			0.7	
Asphaltenes												0.8				

[1]Estimated using Goosens' correlation, Reference 8. [2]Estimated using Goosens' correlation, Reference 9.

the range 208° C. to 443° C., and the aromatics content varied from 21% to 87%. Olefins content varied between 0 vol % and 32 vol %.

This wide variation allowed us to determine the effect of the gas oil's distillation (molecular weight) and chemical nature on the viscosity-temperature dependence.

Testing correlations

Our study tested these correlations:

1. Equations 5 and 6. Kinematic viscosity correlation of Singh et al.[6]

2. Equations 7-9. Correlation of Amin and Maddox as cited by Singh.[6]

3. Equations 10 and 11. Correlation used in the software simulator ChemCAD.[7] Viscosity is computed on the basis of the gas oil's distillation properties and density.

4. Equations 12-18 that predict parameters a and b for each gas oil investigated in this study (Table 3). We used Goossens' correlations for molecular weight and hydrogen content.[8 9]

Table 4 shows the relative deviation between measured and calculated values using the four correlations. The relative deviation is different for all fractions and all correlations. All the correlations exhibited the highest relative deviation for the FCC slurry although there was a significant difference between the accuracy of the tested correlations.

Accuracy of the correlations was, in diminishing order: Singh's correlation, regression, ChemCAD, correlation of Amin and Maddox.

Singh's correlation is also the most appropriate because it requires only one viscosity test at an arbitrary temperature. This study used data of viscosity of the middle distillates at 20° C. and viscosity of heavy gas oils at 50° C.

The correlation of Amin and Maddox was not applicable to HVGOs. ✦

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VISCOSITY PREDICTION OF FOUR CORRELATIONS

Table 4

Component, temperature, °C.	Relative deviation in viscosity: Singh	Amin & Maddox	ChemCAD	This work
SRGO1				
20		7.3	0.5	3.0
30	0.7	8.5	0.0	1.1
40	0.0	7.7	0.6	2.5
50	0.0	6.6	0.8	2.6
60	0.0	5.4	0.9	1.7
Average deviation	0.2	7.1	0.6	2.2
SRGO2				
20		62.1	2.0	2.5
30	1.2	64.4	2.7	2.3
40	1.9	65.2	3.7	4.9
50	1.1	62.5	3.4	4.2
60	1.3	60.3	4.0	2.6
Average deviation	1.3	62.9	3.1	3.3
SRGO3				
20		204.6	4.5	15.3
30	4.6	221.8	0.2	7.4
40	5.3	224.5	1.4	5.1
50	5.3	221.7	2.8	5.8
60	5.3	216.8	4.4	8.4
Average deviation	5.1	217.9	2.7	8.4
LCO				
20		82.2	25.4	17.7
30	1.2	84.9	27.2	16.1
40	4.5	90.2	31.2	14.4
50	4.1	87.9	30.9	17.1
60	5.5	88.1	33.0	19.5
Average deviation	3.8	86.7	29.5	17.0
HCO				
20		168.6	75.9	18.3
30	0.9	175.4	52.8	17.4
40	14.1	223.5	60.1	31.2
50	9.2	212.7	43.6	18.8
60	18.2	239.6	49.1	19.1
Average deviation	10.6	204.0	56.3	21.0
LVGO				
20		230.8	1.3	6.8
30	3.5	247.8	1.6	1.1
40	5.5	256.3	4.1	4.9
50	6.7	258.8	6.5	5.3
60	7.5	257.4	9.0	3.1
Average deviation	5.8	250.2	4.5	4.2

Component, temperature, °C.	Relative deviation in viscosity: Singh	Amin & Maddox	ChemCAD	This work
VBGO1				
20		50.6	4.2	4.6
30	0.9	49.5	2.2	6.1
40	2.1	53.2	4.5	5.8
50	1.9	51.5	4.1	9.8
60	0.7	47.9	3.0	15.5
Average deviation	1.4	50.5	3.6	8.4
VBGO 2				
20		58.1	1.7	0.9
30	0.3	59.5	0.1	1.8
40	1.1	58.8	1.6	0.1
50	0.5	61.1	0.1	1.2
60	3.4	64.6	3.1	2.6
70	3.3	61.9	2.9	8.6
80	0.7	56.3	1.4	16.6
Average deviation	1.5	60.0	1.5	4.5
VBGO 3				
20		97.4	10.7	11.6
30	2.3	105.2	9.7	17.6
40	2.6	106.7	7.7	18.3
50	3.2	107.9	7.3	17.3
60	3	105.9	6.6	13.1
Average deviation	2.8	104.6	8.4	15.6
VGO 1				
40			49.5	18.2
50	13.6		60.0	33.6
60	25.2		69.7	40.3
70	32.3		75.7	36.3
80	35.2		78.3	24.2
Average deviation	26.6		66.6	30.5
VGO 2				
40			5.2	27.5
50	9.0		1.5	17.4
60	11.3		3.6	15.8
70	10.5		4.2	19.9
80	8.9		4.9	26.9
Average deviation	9.9		3.9	21.5
Average deviation for all gas oils	6.9	130.5	18.1	13.6

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TERMINAL SITING—1

Setting parameters early helps focus development

Tere R. Sonne
John G. Bomba
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Establishing critical parameters in screening for siting LNG terminals helps focus eventual development on the objectives of the principal stakeholders: developer, supplier, and end users. Proper site selection and design can determine whether a site is acceptable for further consideration and study. Further study may reveal additional site deficiencies, but high-level initial screening focuses work on the most viable sites.

This first of two articles assesses the factors leading to onshore or offshore terminal location and the influence of LNG vessels on potential marine terminal siting. The concluding article, next week, will consider land requirements for onshore locations, including soil and seismic conditions and site elevations.

Parameters discussed in the two articles include:

- *LNG import-export facility physical criteria.* These include population density, plant area, maximum-minimum distance from loading-unloading to storage, type of storage, site elevation relative to 100-year flood elevation, approach channel width and depth, any constraints on ship passage (such as bridges or overhead power lines), maneuvering area and depth, required underkeel clearance, environmental limitations (wind, wave, current), need for breakwater, allowable downtime, and availability of tugs.
- *LNG vessel characteristics.* Vessel type (membrane, spherical, or barge), vessel capacity, length overall, beam, depth, loaded, and draft air draft.
- *LNG pipeline.* Pipeline capacity, proximity to regasification site, commercial requirements, gas quality, and proximity to end users.

Identification of potential sites for development into export-import terminals is an essential first step in predevelopment of any LNG project. Setting critical parameters to be used in the screening process helps focus a project on the principal stakeholders' objectives.

Based on presentation to Offshore Technology Conference, Houston, May 5-8, 2008.

US LNG TERMINALS, FERC-REGULATED

Fig. 1

Source: US Energy Information Administration

Background

Good site selection can eliminate or minimize many of the hazards and risks associated with shipping, storage, and sendout from terminals.[1] It is in the best interests of the industry that its safety record remains clean.

As of May 2008 five import terminals and one export plant were operating in the US, with many more being designed or constructed. Terminals operating as of May 2008 were:[2]

- Everett, Mass.
- Cove Point, Md.
- Elba Island, Ga.
- Lake Charles, La.
- Gulf Gateway Energy Bridge, Gulf of Mexico.
- Penuelas, PR.

- Sabine, La.
- Freeport, Tex.
- Kenai, Alas. (the only export plant). Kenai exports LNG to Japan.

Fig. 1 shows terminals under jurisdiction of the US Federal Energy Regulatory Commission. Gulf Gateway Energy Bridge is under US Maritime Administration jurisdiction. Several terminals have planned commissioning dates in 2008. FERC lists 47 North American proposed or expanded terminals.[3]

At the beginning of 2008, worldwide there were 26 liquefaction plants in 15 countries. In contrast, there were 60 import, or regasification, marine terminals, on or offshore, spread across 18 different countries. More than 270 LNG tankers deliver LNG to more than 40 ports around the world.

In addition to these terminals, about 73 liquefaction projects and 182 regasification projects are either proposed or under construction around the world. Proposed terminals will likely not all be constructed. Table 1 lists countries having present or future export and import terminals.[4] The locations display a wide variety of likely design conditions. Some of the countries lie in high seismic zones, some in areas where typhoons or hurricanes could affect operations.

Rigorous siting reviews coupled with separation and distance requirements found in US safety codes can reduce risk to the public. Other countries have similar requirements. Dangers to the public from a catastrophic event can also be reduced or eliminated by establishing appropriate separation distances early in a project.

Onshore LNG import terminals might require a breakwater such as used by Sempra at its Costa Azul terminal in Baja California, Mexico. The absence of a breakwater could lead to manifold motions extending beyond the working range of the arms unloading the ship (Fig. 2).

GLOBAL LNG TRADE[1]

Table 1

Exporting countries[2]	Importing countries, territories[2]	Future exporting countries	Future importing countries
Algeria (1971)	Belgium (1987)	Angola	Brazil
Australia (1989)	China (2006)	Bolivia	Canada
Brunei (1972)	Dominican Republic (2003)	East Timor	Germany
Egypt (2004)	France (1972)	Iran	Hong Kong
Equatorial Guinea (2007)	Greece (2000)	Papua New Guinea	Jamaica
Indonesia (1977)	India (2004)	Russia	Netherlands
Libya (1970)	Italy (1971)	Venezuela	New Zealand
Malaysia (1983)	Japan (1969)	Yemen	Pakistan
Nigeria (1999)	Mexico (2006)		Singapore
Norway (2007)	Portugal (2003)		Thailand
Oman (2000)	Puerto Rico (2000)		
Qatar (1997)	South Korea (1986)		
Trinidad & Tobago (1999)	Spain (1969)		
United Arab Emirates (1977)	Taiwan (1990)		
US (1969)	Turkey (1992)		
	UK (1965)		
	US (1971)		

[1]As of Jan. 1, 2008. [2]Start-up year of earliest facility in parentheses.

Design guidelines

The LNG industry has established an excellent safety record over the years. Since Sept. 11, 2001, however, the public has become increasingly concerned about vulnerability to terrorist attacks. The LNG industry has not escaped resulting heightened public scrutiny. Some of the concern stems from public misconceptions about the properties of LNG. The industry has tried to ease these concerns with factual documents providing information in an understandable form. Public agencies have also implemented measures to further reduce public risk. In Boston Harbor, the US Coast Guard has put the waters near any LNG ship off limits to small boats or any kind of shipping.

The US Department of Energy says LNG tankers are unlikely to explode. LNG only becomes flammable if it vaporizes and mixes with air in the correct proportions. LNG is not transported under pressure but in cryogenic liquid form under normal atmospheric pressure. Finally, the tankers are built to withstand incidents such as collisions or bad weather and their multihull design has proven to be robust. Eight incidents involving LNG tankers spilling their cargoes have occurred over the last few decades and in no case was there an explosion or fire. Released LNG typically regasifies and disperses, rising harmlessly into the atmosphere, according to DOE.[5]

Site selection

Site selection for import or export terminals depends on a site's proxim-

LNG CARRIERS

Table 2

Capacity, cu m	266,000	216,000	155,000	138,000	137,500	125,000	87,600
Containment system	Membrane	Membrane	Membrane	Membrane	Spherical	Spherical	Spherical
Type	Qmax	Qflex	—	Repsol	Adgas	North West Shelf	Norman Lady
Deadweight, tonnes	125,700	101,000	75,000	68,200	71,543	66,875	50,922
Length overall, ft	1,032	1,033	935	933.1	961.3	892.4	818.6
Beam, ft	180	164	142.4	139.4	150.3	154.8	131.3
Maximum draft, ft	39.4	39.4	38.7	37.4	37.1	36.1	34.8
Air draft (ballast), ft	174	174	137.5	147.3	—	—	—

ity to gas markets or production areas, respectively. Once a general location has been identified, establishing critical parameters a site must meet allows evaluation of alternative sites within that area.

These parameters include land area and use, existing marine facilities, adjacent and nearby property use, population density, maximum-minimum distance from loading-unloading to storage, type of storage, site elevation relative to 100-year flood elevation, approach channel width and depth, any constraints on ship passage (bridges, overhead power lines, etc.), maneuvering area and depth, required underkeel clearance, environmental limitations (wind, wave, current), need for breakwater, allowable downtime, and availability of tugs.

Pipeline capacity, proximity to regasification site, commercial requirements, gas quality, and location relative to end users also stand as important considerations. The ultimate goal of site selection is to reduce transportation and storage costs. A preferred terminal site allows freedom of choice in design of the facilities and lets the operator safely carry out its activities.

Offshore facilities

Insufficient or inappropriate available land areas, densely populated or recreational areas, and shallow or narrow waterways can each prompt offshore siting instead. An offshore facility may also prove desirable if the shoreline is sensitive to nearshore development affecting marine life or ecosystems. Environmental conditions such as wind, waves, and current will influence the detail design and layout of an offshore terminal. Political hurdles such as permit approvals in the US also need to be addressed.

LNG transfer in unprotected open water requires either calm conditions or new transfer technology capable of tolerating higher sea states. Active joint industry projects (JIPs) are developing this technology.[6]

Onshore facilities

Location influences the design of onshore LNG facilities. Environmental conditions and the concentration and activities of the population surrounding the site influence detailed design and layout. Onshore facilities need to be as close as practicable to the marine operations, preferably adjacent. Such siting reduces the length and diameter of expensive piping runs, avoids the potential risk of running piping past or through other facilities, and provides an integrated operating environment. Distance from a terminal's tanks to carrier should be less than 6 km, preferably less than 2.

Metocean conditions such as wind, wave, and current also require consideration. Sea states potentially encountered along the shoreline of an open ocean may prevent an LNG carrier from docking and could result in motions extending beyond a reasonable working range for the arms unloading the ship.

A breakwater may be required to reduce such motions. Sempra's Costa Azul terminal in Baja California, Mexico, uses such a breakwater (Fig. 2). The need for a breakwater adds to the cost of the terminal, prompting the interest in JIPs to develop new transfer technology requiring less breakwater protection.

Proximity to a commercial pipeline for gas distribution also bears consideration in determining an LNG import terminal's potential location. Even if a pipeline lies close to the facility, it may not have adequate capacity for send-out. If no pipeline exists, one may need to be built or an alternative means for transporting gas to market explored (barges, trucks, or rail). Any preexisting pipeline will also have commercial and gas-quality requirements.

LNG vessels

As of Aug. 7, 2008, 275 LNG carriers were in service. The largest commissioned vessels at that time, Teekay LNG's Al Huwaila and its sister ships, have a capacity of 217,000 cu m.[7] About 102 carriers were on order, with 28 planned for delivery during the balance of 2008.[8] Vessels with capacities as large as 267,000 cu m are under construction. These larger vessels measure 990-1,150 ft long and 164-180 ft wide. Loaded draft measures 38-39.4 ft. Some of the larger vessels also have large air draft requirements. Table 2 lists some typical vessel characteristics.

LNG vessels typically berth for about 24 hr. The USCG provides security inspection and monitors the vessel while in transit to the terminal. This typically has little effect on other vessel traffic if it is a one-way channel.

Vessels transport the equivalent of between 2.0 bcfd for an 88,000 cu m vessel and 4.6 bcfd for a 216,000 cu m vessel, yielding the following delivery schedule for a 138,000 cu m vessel, depending on terminal throughput capacity:

- 5.8 million tonnes/year (0.75 bcfd), one vessel about every 4 days.
- 7.75 million tonnes/year (1.0 bcfd), one vessel about every 3 days.
- 10 million tonnes/year (1.3 bcfd), one vessel every 2 days.
- 20 million tonnes/year (2.6 bcfd), one vessel every day. ✦

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Gas-fired oven for general heat processing operations

Here's a gas-fired, 500° F. walk-in oven for general heat processing operations. The unit is specially modified for overhead crane loading at the user's site.

Workspace dimensions of this No. 1000 oven measure 81 in. wide by 14 ft deep by 12 ft high. There are 600,000 btu installed in a modulating natural gas burner to heat the unit, while a 17,500 cfm, 15 hp recirculating blower provides combination horizontal-vertical airflow to the load.

The walk-in oven features 4 in. insulated walls throughout, aluminized steel interior and exterior, air-operated crane access door atop the oven, plus all safety equipment, including a 1,500 cfm powered forced exhauster. Controls include a digital programming temperature controller.

Source: **Grieve Corp.,** 500 Hart Rd., Round Lake, IL 60073-2835.

Updated simulation helps improve chemical processes

Version 8.2 of South Lake Forest, Calif.-based SimSci-Esscor's PRO/II software is the latest release of this steady-state process simulator used to design, analyze, and improve chemical processes.

In addition to infrastructure upgrades and enhancements that address needs of the hydrocarbon and chemicals processing operations, the software can now be used on Redmond, Wash.-based Microsoft Co.'s Vista Enterprise & Business operating systems, and the firm has provided an updated install procedure and support for Microsoft Office 2007.

PRO/II 8.2 includes improvements for modeling heavy oils and electrolytic systems and for generating pure component properties. The simulator helps improve heavy oils modeling with the addition of a new liquid viscosity prediction method that prevents viscosity from being skewed by the heaviest petroleum component. The software has also integrated the mixed solvent electrolyte model, the latest electrolyte model from Morris Plains, NJ-based OLI Systems Inc., capable of reproducing speciation, chemical, and phase equilibria, applicable to water-organic-salt systems and aqueous solutions from dilute to the fused-salt limit.

Source: **Invensys Process Systems, a unit of Invensys PLC,** Portland House, Bressenden Place, London, SW1E 5BF, UK.

Atwood Oceanics Inc.,

Houston, has received a commitment from an undisclosed operator in West Africa for the Atwood Southern Cross semisubmersible drilling rig to drill a single well. The contract will commence immediately after the rig completes its current contract off Italy. It provides day rates of $262,500 during mobilization from Italy to West Africa and $352,000 during a 60–90-day drilling job.

In addition, the Atwood Aurora, currently under construction, has won a contract from RWE DEA Nile GmbH for work off Egypt. The Atwood Aurora is a LeTourneau Super 116E jack up under construction at Brownsville, Tex., by subsidiary Atwood Oceanics Pacific Ltd. The contract is for a firm period of 2 years at an operating day rate of $165,000, with a cost escalation clause, two options to extend the term to 3 years, and a mobilization payment of $4.5 million. Total construction cost of the Aurora is estimated at $177–180 million.

Atwood Oceanics is engaged in the business of international offshore drilling and completion of exploratory and development oil and gas wells as well as related support, management, and consulting services.

Atwood Southern Cross semisubmersible drilling rig. Photo courtesy of Atwood Oceanics.

Fluke Engenharia Ltda.,

Rio de Janeiro, has renewed its inspection, repair, and maintenance contract, worth more than $50 million, with Petroleo Brasileiro SA (Petrobras). The contract covers the inspection and maintenance of mooring lines on all Petrobras rigs off Brazil until 2012. To meet the requirements of the contract, Fluke is opening a new 11,000 sq m base in Espirito Santo state about 600 km north of the company's headquarters at Macaé. The base is expected to be completed by November 2008.

Fluke, an Acteon Group company, specializes in the design, supply, and maintenance of high-quality mooring equipment. Fluke also provides mooring equipment certification and inspection services. In addition, its Fluke Tecnologia subsidiary provides inspection, maintenance, and certification of lifting equipment and training on lifting operations.

Halo LLC,

Fourchon, La., will open its new rigging warehouse and test facility at Fourchon in September 2008. Halo's facility will be located in InterMoor's 25-acre Fourchon yard and provides both companies with expanded services and capabilities for their customers.

The Halo facility includes an 11,000 sq ft warehouse and fabrication shop, a hydraulic swaging machine capable of pressing up to 3.5-in. sleeves, and seven spooling units, with the largest capable of handling 300,000 lb. In addition, the facility features a 3 million-lb, 220-ft load test bed with 11-ft stroke capable of testing mooring lines and heavy-lift slings of all types and sizes. The test bed is expected to be operational in fourth quarter 2008. By leasing at InterMoor's facility, Halo gains access to InterMoor's heavy-lift and equipment handling capabilities to support its inspection, maintenance, and repair services.

Halo is a top supplier of wire rope and industrial supplies to the offshore industry, offering testing, inspection, and training services.

InterMoor is a leading supplier of mooring technology for rig moves and mooring services, including engineering and design, fabrication, and subsea installation.

United Stars Inc.,

Beloit, Wis., has acquired GearTec Inc., Willoughby, Ohio. Terms of the deal weren't disclosed.

GearTec specializes in the custom fabrication of a wide range of short-run gears up to 100-in.diameter that are marketed to the offshore drilling, wind power, tunnel boring, OEM, steel, crane and related industries for incorporation into a wide range of products. United Stars also owns United Gear & Assembly, another distinguished, long-time manufacturer of medium- to high-volume, smaller-sized gears used in construction equipment, agriculture, transportation, engines, transmissions, and hydraulic pump and motor applications. United Stars is also the parent of United Industries and United Stainless, manufacturers of stainless steel tubing.

East-West Center (EWC),

Honolulu, announced that its president, Charles E, Morrison, was unanimously elected to a second term as chair of the Pacific Economic Cooperation Council (PECC). He is the first chair to have served a 3-year term and the first American to chair PECC since 1993. As chair of PECC, Morrison guides the network of 26 member committees representing most of the economies of the Asia Pacific region. EWC will be the host committee for the next PECC general meeting in Washington, DC, in May 2009. PECC also named Jusuf Wanandi

Morrison

of Indonesia as the Asia co-chair, beginning in 2009. Wanandi has served on the EWC's board of governors and has chaired its International Advisory Panel.

PECC, a nongovernmental organization based in Singapore that is widely regarded as the antecedent to the intergovernmental Asia Pacific Economic Cooperation (APEC) forum, provides information and analytical support for APEC ministerial meetings and working groups, and is one of the three official observers of APEC.

EWC is an education and research organization established by the US Congress in 1960 to strengthen relations among the nations of Asia, the Pacific, and the US. Much of its research focuses on oil and gas, energy, and environmental issues.

Tracerco,

Billingham, UK, has won a contract to supply a Profiler subsea separation monitoring package to FMC Technologies for the Total E&P Angola-operated deepwater Pazflor oil field development project off Angola. The Profiler unit provides accurate and reliable subsea density mapping and interface visualization to allow real-time measurement and control of subsea oil and gas separation. The Profiler is the only separator liquid level, oil/water interface level, and process control measurement system qualified for subsea use. The Pazflor project targets development of hydrocarbons in water depths at 2,000–4,000 ft and entails 49 subsea wells connected via subsea production and injection lines and risers to a spread-moored floating production, storage, and offloading (FPSO) vessel. Tracerco's evolutionary technology for the three gas/liquid subsea separators is scheduled for delivery to FMC Technologies in mid-2009. The topside control system is designed to accommodate a further 21 wells and a fourth gas/liquid subsea separation unit.

Tracerco, a Johnson Matthey PLC company, provides specialized measurement instruments and diagnostics services to increase production, reduce operating costs, and optimize shutdown programs.

Felderhoff Bros. Drilling,

Gainesville, Tex., has agreed to collaborate with Oil Purification Systems (OPS), Shelton, Conn., to implement the OPS Enviro-Pur fluid cleaning system, which helps to lower overall drilling rig maintenance costs by maintaining the quality of lubricating fluids used by all types of rig equipment and by reducing the overall consumption of those fluids. The Enviro-Pur system cleans gear lube while the rig is running, minimizing downtime and equipment breakdown. Felderhoff expects the system to save it more than $500,000/year/rig in repair and rebuilding costs as well as avoided lube costs by essentially eliminating oil changes.

Felderhoff, a Complete Production Services company, operates 22 drilling rigs in North Central Texas.

OPS is a leader in fluid cleaning technology for the oil and gas and other industries.

Aker Solutions,

Oslo, has been awarded several contracts for supply of offloading systems. The total contract value for Aker Solutions is about 85 million kroner (Nor.). The contract awards are from the joint venture Euronav/OSG and MODEC International LLC. The Euronav/OSG contract consists of offloading systems for two floating storage and offloading Units (FSOs). The contract with MODEC is for two offloading systems for an FPSO. The offloading system delivered from Aker Solutions is a configuration of mooring and offloading equipment at the stern/bow of the FSO/FPSO that allows for offshore transfer of crude oil from the FSO/FPSO to a shuttle tanker. The offloading system establishes a safe and secure connection for the hose to the shuttle tanker. This connection can be quickly and safely disconnected, in the event of an emergency, without creating surge loads in the hose. The system can operate at rates up to 15,000 cu m/hr.

The Euronav/OSG vessels are the world's largest crude oil tankers. The vessels will be operated by Euronav/OSG after their conversion to FSOs. MODEC is converting a tanker to an FPSO at Cosco shipyard in Dalian, China. The FPSO will be operated for Petrobras off the coast of Brazil. Delivery of the offloading systems to the FSOs/FPSO will take place during first half 2009.

Meanwhile, parent Aker Solutions ASA has obtained full control of Aker Marine Contractors after acquiring an additional 30% share in the company from Taubåtkompaniet AS, giving Aker Solutions 90% of the namesake marine contracting firm. Separately, Aker Capital AS acquired Taubåtkompaniet's remaining 10% share in Aker Marine Contractors. Aker Solutions ASA expects to acquire the remaining 10% shares held by Aker Capital AS when formalities related to waivers from the participants in Aker Solutions' bank syndicate are in place. The transactions value Taubåtkompaniet's previous shareholding in Aker Marine Contractors at 740 million kroner.

Tandem loading at Espadarte Sul field off Brazil with Aker Solutions' offshore loading system. Photo courtesy of Aker Solutions.

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Aker Marine Contractors also has entered into a 5-year charter with options with Taubåtkompaniet for the BOA Deep C deepwater construction vessel. Aker Marine Contractors has had full marketing control of BOA Deep C since 2004, and since its introduction, the vessel has seen almost full utilization.

Aker Marine Contractors is an international provider of marine operations and installation services to the oil and gas industry, covering floatover, subsea construction, mooring/floater installation, and facilities removal services. In addition to the BOA Deep C, Aker Marine also charters the BOA Sub C deepwater construction vessel.

Aker Solutions ASA is a leading global provider of engineering and construction services, technology products, and integrated solutions. Aker Solutions serves several industries, including oil and gas, refining and chemicals, mining and metals, and power generation.

Noble Denton Consultants Ltd.,

London, has secured a $3.5 million contract from Abu Dhabi-based Gulf Marine Services (GMS) to carry out detailed design work for a multipurpose, self-propelled, jack up lift boat, the Gusto MSC NG-2500X. Full detailed engineering work will be carried out by the company's subsidiary ODL from its Sharjah base; work on the primary structure is already underway. The current design is intended for well services, repair and maintenance, installation, and decommissioning projects. It has accommodation for 150 personnel, has a 280-tonne capacity crane, and can operate in 200 ft of water. Hull construction will take place in China and take about 9 months to finish. The vessel will then be completed at GMS's own facility in the UAE.

Noble Denton provides life-cycle marine and offshore engineering services to the oil and gas and renewables industries.

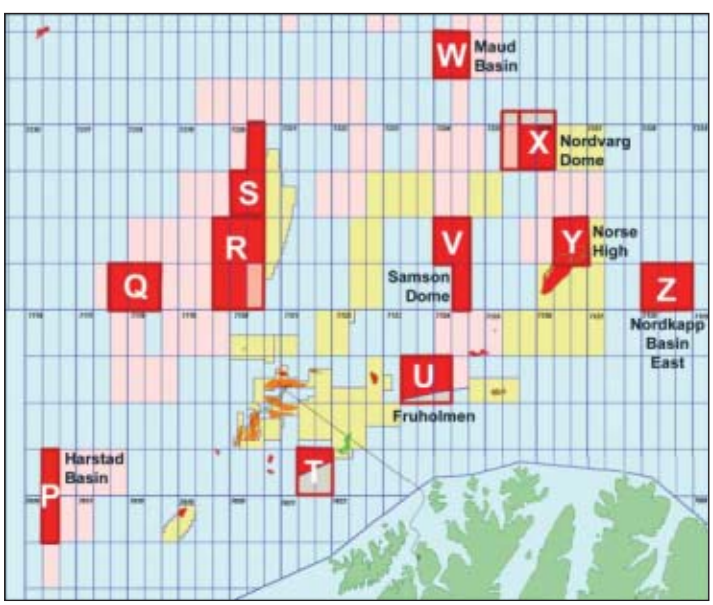
GMS owns and operates elevated support vessels, as well as supply and anchor handling tug supply vessels for work in the oil and gas industry worldwide.

Paradigm BV,

Amsterdam, has agreed to collaborate with Vietnam Petroleum Institute (VPI) on geosciences consulting projects within Vietnam. The agreement calls for cooperation on projects related to seismic interpretation, prospect generation, geological modeling, integrated field studies, and field development plans. In support of this collaboration, Paradigm will install its software at VPI offices in Hanoi and Ho Chi Minh City and conduct training for VPI employees.

Paradigm is an industry leader in digital subsurface asset management, serving oil and gas companies worldwide.

VPI carries out scientific and technological studies in exploration, production, transportation, storage distribution, petrochemical and processing, safety and environment, economics, and management of oil and gas for companies inside and outside the petroleum industry, as well as for foreign oil companies operating within Vietnam, cooperating with local and international organizations in these fields. VPI also provides training to improve professional capability of personnel working in the oil and gas industry, including post-graduate programs.



EMGS electromagnetic survey in Barents Sea off Norway Illustration courtesy of EMGS.

ENSCO International Inc.,

Dallas, has finalized a shipyard construction contract for a new ultradeepwater semisubmersible rig to be named ENSCO 8506. The contract for construction of the rig was entered into with Keppel FELS Ltd.'s shipyard in Singapore at a total project cost currently projected to be $560 million. Delivery is expected in second half 2012. ENSCO 8506 is the company's seventh ultradeepwater semisubmersible rig in the ENSCO 8500 series currently under construction and will be part of the company's eight-rig deepwater fleet that includes the ENSCO 7500 deepwater semisubmersible, which has been in service since 2000. The first four of the ENSCO 8500 rigs to be delivered are contracted to customers for term work commencing upon delivery, and marketing of the three latest ENSCO 8500 rigs already is underway.

ENSCO owns and operates a modern fleet of offshore drilling rigs serving the petroleum industry on a global basis.

Electromagnetic Geoservices (EMGS),

Trondheim, Norway, has completed the world's largest multiclient electromagnetic (EM) survey in the Barents Sea, ahead of Norway's 20th exploration licensing round. The survey area, at more than 9,000 sq km and covering 30 blocks, includes all the Barents Sea acreage in the licensing round. The service on offer is Clearplay Find, which is a further development of the service previously referred to as 3-D scanning. Clearplay Find data are acquired using 3-km-sampled, wide-azimuth 3-D EM grids.

EMGS is a market leader in EM imaging, having launched the EM imaging industry in 2002 with the commercialization of seabed logging, a proven exploration method that uses EM energy to help oil companies in their search for hydrocarbons. EMGS provides a full suite of services, including data planning, acquisition, imaging, and interpretation.

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Imports of crude and products

	Districts 1-4		District 5		Total US		
	8-22 2008	8-15 2008	8-22 2008	8-15 2008	8-22 2008	8-15 2008	*8-24 2007
	1,000 b/d						
Total motor gasoline	1,317	693	51	101	1,368	794	927
Mo. gas. blending comp.	1,090	633	12	52	1,102	685	601
Distillate	123	73	0	0	123	73	428
Residual	166	355	218	146	384	501	247
Jet fuel-kerosine	45	90	22	5	67	95	283
Propane-propylene	138	111	10	10	148	121	186
Other	(167)	648	113	9	(54)	657	511
Total products	**2,712**	**2,603**	**426**	**323**	**3,138**	**2,926**	**3,183**
Total crude	**8,643**	**9,770**	**1,336**	**1,221**	**9,979**	**10,991**	**10,815**
Total imports	**11,355**	**12,373**	**1,762**	**1,544**	**13,117**	**13,917**	**13,998**

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

Purvin & Gertz LNG netbacks—Aug. 29, 2008

Receiving terminal	Liquefaction plant					
	Algeria	Malaysia	Nigeria	Austr. NW Shelf	Qatar	Trinidad
	$/MMbtu					
Barcelona	9.74	7.55	8.71	7.42	7.94	8.61
Everett	7.04	4.64	6.62	4.68	5.35	7.41
Isle of Grain	9.91	10.18	10.28	10.04	10.97	10.15
Lake Charles	5.27	2.99	5.03	3.20	3.58	5.94
Sodegaura	9.30	11.36	9.55	10.97	10.07	8.37
Zeebrugge	10.94	8.58	10.25	8.40	9.31	10.24

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	13,771	53,906	31,733	11,462	49,950	14,021	4,107
PADD 2	63,094	48,566	17,703	7,302	29,683	2,202	21,607
PADD 3	159,593	60,853	29,812	13,595	37,234	16,142	23,901
PADD 4	14,371	6,209	1,739	447	2,808	283	[1]2,324
PADD 5	54,931	25,907	19,593	9,266	12,450	5,051	—
Aug. 22, 2008	**305,760**	**195,441**	**100,580**	**42,072**	**132,125**	**37,699**	**51,939**
Aug. 15, 2008	**305,937**	**196,620**	**100,918**	**40,925**	**132,068**	**36,863**	**50,763**
Aug. 24, 2007[2]	**337,118**	**196,231**	**88,163**	**41,918**	**129,025**	**36,476**	**53,370**

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

Refinery report—Aug. 22, 2008

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	1,389	1,394	2,139	83	520	136	60
PADD 2	3,307	3,272	2,269	233	974	53	191
PADD 3	7,394	7,252	3,018	753	2,139	266	700
PADD 4	545	546	312	27	179	15	[1]149
PADD 5	2,731	2,647	1,413	460	583	121	—
Aug. 22, 2008	**15,366**	**15,111**	**9,151**	**1,556**	**4,395**	**591**	**1,100**
Aug. 15, 2008	**15,089**	**14,811**	**9,065**	**1,583**	**4,405**	**543**	**1,055**
Aug. 24, 2007[2]	**15,987**	**15,727**	**9,287**	**1,457**	**4,206**	**666**	**1,044**
	17,606 Operable capacity		**87.3 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

	*8-29-08	*8-31-07	Change $/bbl	Change, %
SPOT PRICES				
Product value	127.99	87.16	40.84	46.9
Brent crude	114.85	70.83	44.02	62.2
Crack spread	13.14	16.32	–3.18	–19.5
FUTURES MARKET PRICES				
One month				
Product value	129.07	85.81	43.26	50.4
Light sweet crude	116.12	72.64	43.48	59.9
Crack spread	12.95	13.16	–0.21	–1.6
Six month				
Product value	128.42	83.12	45.30	54.5
Light sweet crude	117.93	70.20	47.73	68.0
Crack spread	10.49	12.92	–2.43	–18.8

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

OGJ GASOLINE PRICES

	Price ex tax 8-27-08	Pump price* 8-27-08	Pump price 8-29-07
	¢/gal		
(Approx. prices for self-service unleaded gasoline)			
Atlanta	325.3	369.7	275.4
Baltimore	330.5	372.4	266.5
Boston	328.6	370.5	263.5
Buffalo	306.1	365.7	279.5
Miami	315.1	366.7	284.5
Newark	326.7	359.6	267.4
New York	309.6	369.2	279.5
Norfolk	326.3	364.3	261.1
Philadelphia	321.4	372.1	278.5
Pittsburgh	317.6	368.3	275.4
Wash., DC	329.4	367.8	278.4
PAD I avg	321.5	367.9	273.6
Chicago	339.9	397.8	291.9
Cleveland	316.4	362.8	279.2
Des Moines	316.7	356.8	281.0
Detroit	319.1	373.5	282.2
Indianapolis	312.7	362.8	282.9
Kansas City	320.8	356.8	273.5
Louisville	329.9	366.8	290.0
Memphis	316.0	355.8	286.6
Milwaukee	320.5	371.8	284.2
Minn.-St. Paul	323.4	363.8	267.5
Oklahoma City	316.4	351.8	260.4
Omaha	324.5	366.8	282.5
St. Louis	321.8	357.8	287.2
Tulsa	315.1	350.5	257.9
Wichita	309.4	352.8	280.0
PAD II avg	320.2	363.2	279.1
Albuquerque	322.8	359.2	273.7
Birmingham	321.4	360.0	264.4
Dallas-Fort Worth	309.9	348.3	262.4
Houston	307.0	345.4	268.3
Little Rock	318.9	359.1	264.4
New Orleans	323.3	361.7	267.7
San Antonio	319.7	358.1	262.4
PAD III avg	317.6	356.0	266.2
Cheyenne	333.0	365.4	275.0
Denver	354.3	394.7	284.5
Salt Lake City	348.8	391.7	286.4
PAD IV avg	345.4	383.9	282.0
Los Angeles	341.3	405.2	278.3
Phoenix	335.5	372.9	280.1
Portland	336.2	379.6	277.3
San Diego	339.3	403.2	290.6
San Francisco	351.0	414.9	288.9
Seattle	336.2	390.6	274.5
PAD V avg	339.9	394.4	281.6
Week's avg.	**324.7**	**369.2**	**276.1**
Aug. avg.	**330.8**	**375.3**	**280.8**
July avg.	**361.3**	**405.7**	**295.2**
2008 to date	**309.0**	**352.9**	—
2007 to date	**228.7**	**272.2**	—

*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

	8-22-08 ¢/gal		8-22-08 ¢/gal
Spot market product prices			
Motor gasoline (Conventional-regular)		Heating oil No. 2	
New York Harbor	281.84	New York Harbor	311.68
Gulf Coast	282.49	Gulf Coast	310.75
Los Angeles	285.84	Gas oil	
Amsterdam-Rotterdam-Antwerp (ARA)	281.86	ARA	320.42
Singapore	282.38	Singapore	316.31
Motor gasoline (Reformulated-regular)		Residual fuel oil	
New York Harbor	288.22	New York Harbor	223.52
Gulf Coast	280.49	Gulf Coast	236.24
Los Angeles	291.84	Los Angeles	273.26
		ARA	251.22
		Singapore	252.23

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

BAKER HUGHES RIG COUNT

	8-29-08	8-31-07
Alabama	7	6
Alaska	9	4
Arkansas	59	50
California	51	36
Land	49	34
Offshore	2	2
Colorado	116	117
Florida	3	1
Illinois	1	1
Indiana	2	3
Kansas	9	14
Kentucky	11	11
Louisiana	182	179
N. Land	81	64
S. Inland waters	22	23
S. Land	26	27
Offshore	53	65
Maryland	0	1
Michigan	2	3
Mississippi	13	9
Montana	13	16
Nebraska	1	0
New Mexico	97	82
New York	7	6
North Dakota	74	42
Ohio	10	14
Oklahoma	215	198
Pennsylvania	26	17
South Dakota	2	1
Texas	958	853
Offshore	9	6
Inland waters	1	1
Dist. 1	28	26
Dist. 2	37	31
Dist. 3	62	56
Dist. 4	90	90
Dist. 5	198	190
Dist. 6	129	135
Dist. 7B	26	33
Dist. 7C	74	61
Dist. 8	141	110
Dist. 8A	33	16
Dist. 9	39	30
Dist. 10	91	68
Utah	50	42
West Virginia	27	33
Wyoming	76	79
Others—OR-1; TN-2; VA-6; WA-1	10	11
Total US	**2,031**	**1,829**
Total Canada	**436**	**305**
Grand total	**2,467**	**2,134**
Oil rigs	416	300
Gas rigs	1,606	1,523
Total offshore	70	75
Total cum. avg. YTD	**1,854**	**1,758**

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	8-29-08 Percent footage*	Rig count	8-31-07 Percent footage*
0-2,500	88	3.4	60	8.3
2,501-5,000	136	51.4	103	56.3
5,001-7,500	247	15.3	229	23.5
7,501-10,000	489	2.8	444	4.2
10,001-12,500	476	1.6	440	0.9
12,501-15,000	360	—	285	0.3
15,001-17,500	147	—	114	—
17,501-20,000	84	—	68	—
20,001-over	36	—	35	—
Total	**2,063**	**6.4**	**1,778**	**7.9**
INLAND	33		45	
LAND	1,970		1,668	
OFFSHORE	60		65	

*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]8-29-08	[2]8-31-07
	1,000 b/d	
(Crude oil and lease condensate)		
Alabama	20	21
Alaska	685	631
California	644	657
Colorado	60	59
Florida	5	5
Illinois	27	27
Kansas	100	106
Louisiana	525	1,220
Michigan	15	15
Mississippi	53	57
Montana	96	94
New Mexico	160	160
North Dakota	124	125
Oklahoma	170	170
Texas	1,139	1,328
Utah	50	54
Wyoming	149	149
All others	61	79
Total	**4,083**	**4,957**

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

US CRUDE PRICES

	8-29-08 $/bbl*
Alaska-North Slope 27°	127.45
South Louisiana Sweet	118.25
California-Kern River 13°	102.60
Lost Hills 30°	110.85
Wyoming Sweet	101.46
East Texas Sweet	111.50
West Texas Sour 34°	104.50
West Texas Intermediate	112.00
Oklahoma Sweet	112.00
Texas Upper Gulf Coast	108.50
Michigan Sour	105.00
Kansas Common	111.00
North Dakota Sweet	103.25

*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]	8-22-08
United Kingdom-Brent 38°	110.10
Russia-Urals 32°	105.96
Saudi Light 34°	108.36
Dubai Fateh 32°	109.64
Algeria Saharan 44°	112.81
Nigeria-Bonny Light 37°	114.22
Indonesia-Minas 34°	116.05
Venezuela-Tia Juana Light 31°	111.56
Mexico-Isthmus 33°	111.45
OPEC basket	112.01
Total OPEC[2]	109.47
Total non-OPEC[2]	108.99
Total world[2]	109.26
US imports[3]	108.15

[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]

	8-22-08	8-15-08	8-22-07	Change, %
	bcf			
Producing region	777	752	903	–14.0
Consuming region east	1,609	1,540	1,644	–2.1
Consuming region west	371	363	410	–9.5
Total US	**2,757**	**2,655**	**2,957**	**–6.8**
	June 08	**June 07**	**Change, %**	
Total US[2]	**2,171**	**2,580**	**–15.9**	

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

Statistics

WORLDWIDE CRUDE OIL AND GAS PRODUCTION

	June 2008	May 2008	6 month average production 2008	6 month average production 2007	Change vs. previous year Volume	Change vs. previous year %	June 2008	May 2008	Cum. 2008
	Crude, 1,000 b/d						Gas, bcf		
Argentina	630	600	619	630	–11	–1.8	149.0	126.0	759.18
Bolivia	40	40	40	45	–4	–9.6	41.5	43.0	250.60
Brazil	1,830	1,815	1,790	1,752	38	2.2	37.0	36.0	218.00
Canada	2,490	2,451	2,524	2,587	–63	–2.4	411.7	445.2	2,841.21
Colombia	580	578	568	521	47	9.0	23.0	24.0	133.00
Ecuador	500	500	500	502	–2	–0.3	1.0	1.0	6.00
Mexico	2,839	2,798	2,856	3,162	–306	–9.7	210.6	212.4	1,223.80
Peru	113	104	108	114	–6	–5.3	11.0	10.0	52.00
Trinidad	110	110	113	124	–11	–8.9	111.0	115.0	689.72
United States	5,104	5,166	5,130	5,139	–10	–0.2	1,782.0	1,814.0	10,656.00
Venezuela[1]	2,360	2,360	2,373	2,403	–30	–1.2	72.0	75.0	444.00
Other Latin America	81	80	80	80	—	0.5	5.3	5.5	32.54
Western Hemisphere	**16,676**	**16,601**	**16,701**	**17,058**	**–358**	**–2.1**	**2,855.1**	**2,907.1**	**17,306.04**
Austria	17	16	16	17	–1	–5.7	4.8	4.8	30.30
Denmark	294	291	291	311	–20	–6.6	27.1	29.1	175.32
France	20	19	20	19	1	5.3	2.8	2.9	17.94
Germany	60	59	61	69	–8	–11.0	40.0	43.7	278.91
Italy	95	97	104	110	–6	–5.5	23.0	25.0	151.00
Netherlands	40	40	39	43	–4	–8.2	140.0	150.0	1,610.00
Norway	2,002	2,247	2,162	2,301	–139	–6.0	245.0	270.0	1,803.00
Turkey	42	41	40	41	–1	–1.4	—	—	—
United Kingdom	1,400	1,501	1,477	1,581	–104	–6.6	200.0	224.0	1,387.31
Other Western Europe	4	4	4	4	—	0.3	1.1	1.4	13.55
Western Europe	**3,974**	**4,315**	**4,215**	**4,496**	**–281**	**–6.2**	**683.9**	**750.9**	**5,467.32**
Azerbaijan	1,000	940	949	837	113	13.4	32.0	30.0	188.00
Croatia	15	15	15	16	–1	–6.4	5.7	5.8	33.72
Hungary	15	15	15	17	–2	–11.1	6.9	6.8	42.66
Kazakhstan	1,400	1,400	1,390	1,067	323	30.3	50.0	50.0	363.00
Romania	95	95	95	99	–4	–3.6	17.0	18.0	105.00
Russia	9,720	9,720	9,735	9,872	–137	–1.4	1,800.0	1,900.0	11,900.00
Other FSU	400	400	400	433	–33	–7.7	400.0	500.0	2,890.00
Other Eastern Europe	50	50	50	46	3	7.3	14.5	14.9	101.77
Eastern Europe and FSU	**12,696**	**12,636**	**12,649**	**12,386**	**263**	**2.1**	**2,326.1**	**2,525.5**	**15,624.14**
Algeria[1]	1,380	1,380	1,385	1,343	42	3.1	270.0	280.0	1,645.00
Angola[1]	1,965	1,944	1,919	1,644	276	16.8	5.0	5.0	29.60
Cameroon	84	85	87	84	3	3.7	—	—	—
Congo (former Zaire)	20	20	20	20	—	—	—	—	—
Congo (Brazzaville)	240	240	240	240	—	—	—	—	—
Egypt	610	610	620	645	–25	–3.9	130.0	135.0	810.00
Equatorial Guinea	320	320	320	320	—	—	0.1	0.1	0.36
Gabon	240	240	230	230	—	—	0.3	0.3	1.83
Libya[1]	1,750	1,730	1,753	1,693	60	3.5	33.0	35.0	202.00
Nigeria[1]	1,830	1,760	1,933	2,168	–235	–10.8	80.0	80.0	463.00
Sudan	480	480	480	465	15	3.2	—	—	—
Tunisia	89	78	82	99	–18	–17.9	5.4	1.7	30.07
Other Africa	217	217	217	218	–1	–0.5	8.7	9.1	53.10
Africa	**9,225**	**9,104**	**9,287**	**9,170**	**117**	**1.3**	**532.5**	**546.2**	**3,234.96**
Bahrain	170	170	170	172	–2	–1.4	24.0	25.0	143.88
Iran[1]	3,950	3,740	3,948	3,913	35	0.9	280.0	280.0	1,760.00
Iraq[1]	2,510	2,505	2,423	1,952	471	24.1	20.0	20.0	115.20
Kuwait[1,2]	2,635	2,635	2,603	2,398	205	8.5	45.0	40.0	238.00
Oman	720	720	722	718	3	0.5	58.0	60.0	346.00
Qatar[1]	880	850	850	800	50	6.3	170.0	170.0	1,005.00
Saudi Arabia[1,2]	9,315	9,065	9,047	8,490	557	6.6	220.0	220.0	1,295.00
Syria	380	380	385	392	–7	–1.7	17.0	18.0	105.00
United Arab Emirates[1]	2,670	2,660	2,642	2,570	72	2.8	130.0	135.0	795.00
Yemen	300	310	312	348	–37	–10.5	—	—	—
Other Middle East	—	—	—	—	—	–38.3	9.8	9.3	62.07
Middle East	**23,530**	**23,035**	**23,100**	**21,754**	**1,347**	**6.2**	**973.8**	**977.3**	**5,865.15**
Australia	453	454	433	453	–20	–4.5	110.9	116.1	655.80
Brunei	144	153	163	182	–19	–10.7	27.0	31.9	199.57
China	3,895	3,821	3,799	3,775	23	0.6	276.9	257.9	1,471.80
India	635	698	674	686	–12	–1.7	81.8	89.7	509.08
Indonesia[1]	860	860	860	845	15	1.7	190.0	200.0	1,170.00
Japan	14	15	17	17	—	—	9.5	9.4	66.77
Malaysia	720	750	758	745	13	1.8	140.0	150.0	875.00
New Zealand	55	64	61	19	41	212.9	14.0	14.0	75.90
Pakistan	68	66	67	67	0	0.2	119.3	123.8	738.88
Papua New Guinea	40	42	43	50	–7	–14.4	0.9	1.0	5.70
Thailand	238	236	224	212	13	5.9	43.0	44.0	268.00
Vietnam	280	280	292	320	–28	–8.9	15.0	15.5	89.50
Other Asia-Pacific	30	30	31	36	–5	–14.1	93.3	97.5	576.77
Asia-Pacific	**7,432**	**7,469**	**7,420**	**7,407**	**13**	**0.2**	**1,121.6**	**1,150.9**	**6,702.77**
TOTAL WORLD	**73,533**	**73,160**	**73,372**	**72,271**	**1,100**	**1.5**	**8,493.0**	**8,857.9**	**54,200.38**
OPEC	32,605	31,989	32,236	30,220	2,016	6.7	1,516.0	1,541.0	9,167.80
North Sea	3,713	4,058	3,949	4,212	–264	–6.3	513.8	567.9	3,846.81

[1]OPEC member. [2]Kuwait and Saudi Arabia production each include half of Neutral Zone. Totals may not add due to rounding.
Source: Oil & Gas Journal. Data available in OGJ Online Research Center.

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Russian leaders act intoxicated by oil revenue

If, as some say, America is addicted to oil, Russia is stumbling drunk on the stuff.

Moscow's bullying of Georgia is the geopolitical equivalent of saloon behavior. And its leaders are saying things that bespeak the grave need for a collective blood test.

An example comes from Anatoliy Nogovitsyn, deputy chief of the Russian General Staff. On Aug. 15 he told the Russian news

The Editor's Perspective

by Bob Tippee, Editor

agency Interfax that nuclear attack would be a legitimate response to Poland's participation in a US-sponsored missile shield against a potential nuclear threat from Iran.

More seemingly intoxicant blather spewed from Vitaly Churkin, Russia's ambassador to the United Nations, Aug. 28 in response to US criticism of Moscow's recognition of independence for the Georgian states of South Ossetia and Abkhazia.

According to Radio Free Europe/Radio Liberty, Churkin said: "I really liked the statement of the US permanent representative, who was reminding to the members of the Security Council that states must refrain from the use of force or from the threat of use of force. I would like to ask the honorable representative of the United States: Have you found weapons of mass destruction in Iraq, or are you still looking for them?"

Now Russian Prime Minister Vladimir Putin blames the US for his country's Georgian adventure.

In an Aug. 28 interview with CNN, Putin said the US encouraged Georgia to attack South Ossetia to help a presidential candidate.

"US citizens were indeed in the area of conflict," he said. "They were acting in implementing those orders, doing as they were ordered, and the only one who can give such orders is their leader."

The same day, Putin announced a ban on imports of poultry products from 19 US companies for supposed violations of health standards. International oil companies operating in Russia will recognize this drill.

Feeding Russian bravado, of course, is an economy heady from oil revenue but resistant to diversification and increasingly repellent to outside capital.

The day after Moscow's bender ends—and it will—won't feel good. Other countries must wonder how many Russian bottles will break over innocent heads in the meantime.

(Online Aug. 29, 2008; author's e-mail: bobt@ogjonline.com)

Market Journal

by Sam Fletcher, Senior Writer

Gustav menaces Gulf Coast

On Aug. 29, just 3 years to the day after Hurricane Katrina came ashore in Louisiana and devastated New Orleans, Tropical Storm Gustav was over open waters of the Caribbean and predicted to intensify into a hurricane and make landfall west of that same city, possibly Labor Day, Sept. 1.

Although downgraded from a Category 1 hurricane by its passage over Haiti, Gustav remained the most menacing storm and first major threat to US offshore and Gulf Coast refining since 2005, pushing up energy prices Aug. 26-27 and reversing a 2-month downward trend. Yet the October natural gas contract led a drop in energy prices Aug. 28 in New York as a bigger-than-expected injection of gas into US underground storage grabbed traders' attention.

The Energy Information Administration reported injection of 102 bcf of gas into US underground storage in the week ended Aug. 22. That put gas storage near 2.7 tcf, 200 bcf less than in the same period a year ago but 71 bcf above the 5-year average. In New Orleans, analysts at Pritchard Capital Partners LLC said, "Even with Tropical Storm Gustav's path likely targeting oil and gas infrastructure in the Gulf of Mexico, not to mention the 2-3 other [pressure] systems that are forming behind it, traders were unable to ignore such a large injection this late in the summer."

With benchmark US crudes only $1/bbl higher Aug. 28 than the Aug. 22 close on NYMEX, there had been "so far a very limited premium for Gustav," said Olivier Jakob at Petromatrix, Zug, Switzerland. "While the destructive potential of Gustav cannot be ignored, the current state of demand destruction makes it more difficult than in previous years to adequately price a premium for that potential."

He said, "In 2005 when Katrina hit the US Gulf, US refineries were running at 97% of capacity; today they are at 87%." With US demand 1.6 million b/d lower than when Katrina struck, the country is less exposed to the potential destructive impact of a hurricane. "However, we must also recognize that volatility and speculative sensitivity is higher today than in 2005; hence we are not ready to ignore the price impact that Gustav could have," Jakob said.

Paul Horsnell, Barclays Capital Inc., London, predicted Gustav would be "fairly critical" in "setting the tone of the market" through early September and "also plays into the dynamics" of the scheduled Sept. 9 meeting of the Organization of Petroleum Exporting Countries.

Demand declines

Meanwhile, an EIA report Aug. 26 revised downward US oil demand, dropping June demand by 793,000 b/d to 19.55 million b/d, "the lowest June reading since 1998 and [representing] a year-over-year decline of 1.17 million b/d (5.6%)," said Horsnell.

Jakob said, "Gasoline sales in June were 4.4% lower than a year ago, and sales of middle distillates were down an impressive 9.4%." He said, "Looking at the demand of main products (excluding LPG), not only is demand continuously lower than previous years but has been dropping from April to June while it usually seasonally does the opposite. The US might be dependent on foreign crude oil to run its refineries, but the same refineries have now turned fully dependent on exports to maintain their operating margins."

The Russian factor

Of "longer-term importance" than the potential impact of Gustav are that the "changes in Russia's external political relations has created barely a ripple [in world markets] nor has the new fog around Caspian energy development or Russia's external energy relations attracted much more than a glance," Horsnell said. "Likewise, some striking (or at least fog generating), fundamental data on both the supply and demand side has emerged...without getting much more than minimal attention."

In the week ended Aug. 29, China joined the US and other Western nations in opposing Russia's formal recognition of Abkhazia and South Ossetia as independent states, a move that would redraw the borders of Georgia. Horsnell said, "The recasting of relations between Russia and the US in recent weeks, and the question marks put on the pace of Caspian development and its reliability following pipeline attacks in Turkey and the Georgian conflict represent a set of issues that are likely to take a while to fully play out. They are, however...significant as drivers of the eventual shape of the oil market. A significant portion of consensus outlooks for non-OPEC supply in coming years still rests on Russia and the Caspian. Indeed, those areas have been central in many outlooks in the short run as well."

(Online Sept. 1, 2008; author's e-mail: samf@ogjonline.com)

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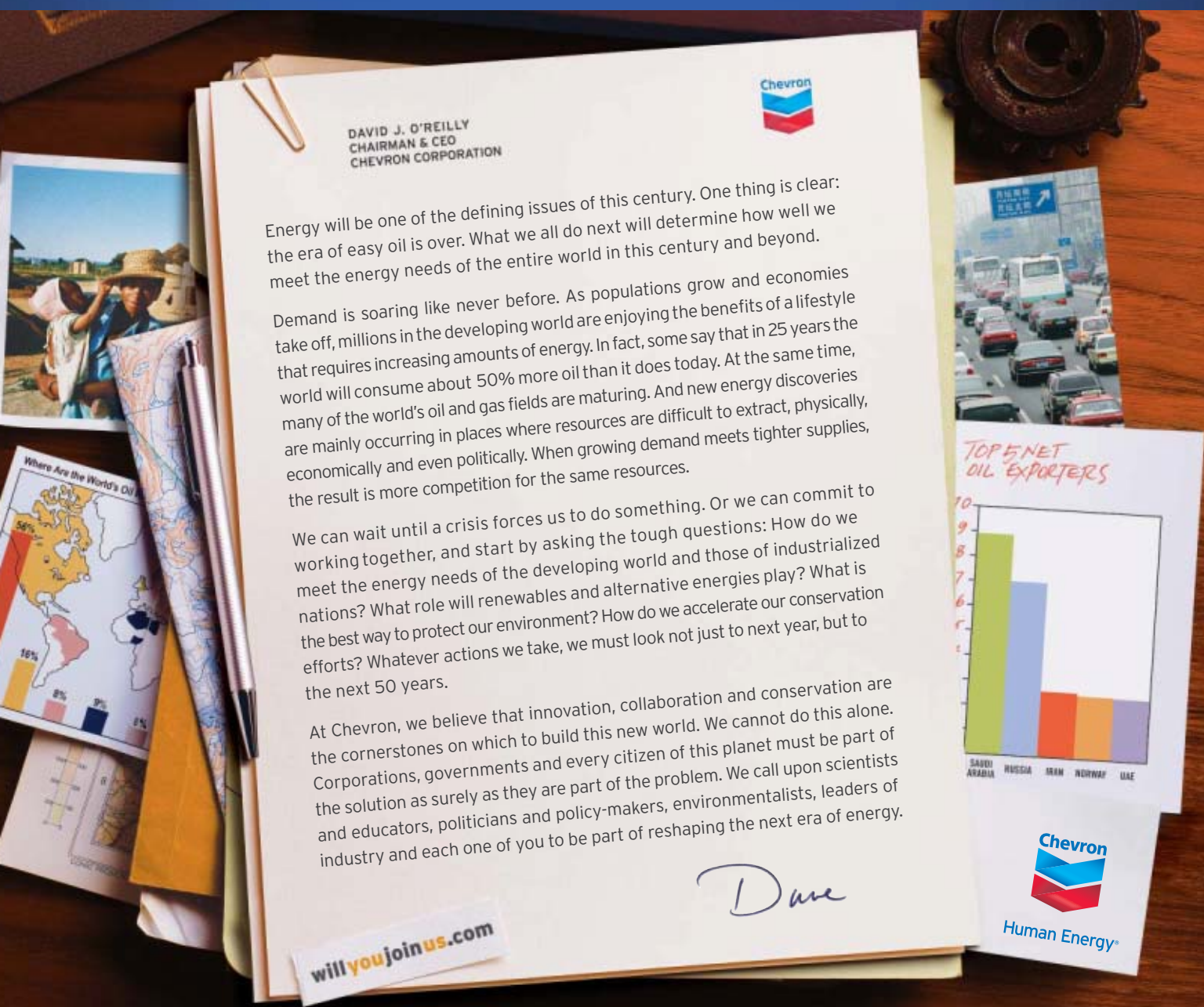

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