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Drilling Report

OIL&GAS JOURNAL®

Oct. 22, 2007
Volume 105.40

DRILLING REPORT

REGULAR FEATURES

COVER

Overflow from the Colville River during spring break up surrounds the 6-acre Oooguruk gravel island, Beaufort Sea, in June 2007 (photo from Pioneer Natural Resources Alaska Inc.). Nabors Alaska Drilling Co.'s Rig 19 was moved to the island in April and is the first AC rig to operate on the North Slope. The annual drilling report, starting on p. 41, reviews worldwide drilling activity, operator and contractor activities, and the record number of offshore rigs under construction. The Canadian drilling report, p. 50, discusses drilling forecasts, rig fleets, and upcoming projects, in the face of depressed natural gas prices and potential royalty changes.
The Zeus jack up, shown above, has loomed at the edge of the Freeport harbor channel, Brazoria Co., Tex., for decades. The state plans to remove it soon, after which boaters will be able to navigate by the storage tanks under construction at the adjacent Freeport LNG terminal.

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Oct. 22, 2007

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General Interest — Quick Takes

DOE to continue RIK fill program for SPR

The US Department of Energy on Oct. 10 solicited contracts to exchange as much as 13 million bbl of crude oil from federal Gulf of Mexico leases for crude that meets Strategic Petroleum Reserve specifications. Bids are due by Nov. 6.

DOE said the solicitation follows provisions of the 2005 Energy Policy Act, which directs that the SPR be filled to its authorized 1 billion bbl capacity. The reserve's current capacity is 727 million bbl. It currently holds 693 million bbl of inventory.

The solicitation calls for about 70,000 b/d to be added over 6 months. DOE said the royalty in-kind (RIK) contracts would begin in January 2008, with deliveries to begin on or around Feb. 1 and completed by July 31.

Under the federal RIK program, federal lessees deliver crude in lieu of royalties to the US Minerals Management Service, which then resells it on the open market. MMS has said the program is more efficient and saves the government money.

House Natural Resources Committee Chairman Nick J. Rahall (D-W.Va.) has been critical of the RIK program's operation, however, and the energy bill that cleared the committee earlier this year contained a provision limiting future oil royalties in-kind to SPR refills. It was not part of a later energy bill that the full House approved, a committee spokeswoman told OGJ.

DOE said that in such purchases, lessees deliver the royalty crude to market centers along the Gulf Coast, and ownership is transferred to DOE from the Department of the Interior. Contractors are required to take the full contracted amount from the market centers and deliver exchange oil to the SPR. Actual volumes delivered to the reserve reflect account adjustments for quality differences and transportation costs, DOE said.

EU's Solana promotes EU-Asia energy cooperation

European Union foreign policy chief Javier Solana in Central Asia Oct. 10 expressed hope that disagreement over the Kashagan oil field project will be solved in terms of the existing agreement.

"We hope that the solution to this issue will soon be found in terms of the [production-sharing] agreement that has been signed, and that the solution will be found without modifying the agreement," said Solana, referring to the dispute between the Kazakh government and the Eni SPA-led consortium developing the field (OGJ Online, Oct. 8, 2007).

"I am sure this issue will be solved in a positive and constructive manner," said Solana, who added that Europe intends to cooperate with Kazakhstan in the exploitation of energy resources.

In particular, he said a trans-Caspian pipeline should be built to transmit gas from Central Asia to Europe.

"It's a project that has to be implemented," said Solana, who added that the project had been discussed at meetings with Kazakh and Turkmen leaders.

Solana was in Kazakhstan as part of a Central Asian tour to promote cooperation between the region and the EU, particularly in the field of energy resources.

On Oct. 9, Solana visited Turkmenistan, where he also promoted energy cooperation with the EU and construction of the trans-Caspian pipeline.

Exploration proceeds off Myanmar as crisis boils

Exploration work on Myanmar's Block M9 in the Gulf of Martaban is progressing "normally," according to Thailand's majority state-owned PTT Exploration & Production PLC, despite Myanmar's biggest street protests in 20 years. A major natural gas discovery was made on the block, which lies 300 km south of Yangon, just a week before the violent crackdown on demonstrations began.

Four exploration and four appraisal wells have already been drilled on Block M9, and plans are afoot to drill an additional four to five appraisal wells to confirm petroleum reserves. Drilling will take place between December and April 2008 (OGJ Online, Aug. 15, 2007).

Exploration results have confirmed the commercial potential of Block M9, and PTTEP executives indicated earlier that 300 MMcfd could be brought on stream in 2011 or 2012 (OGJ Online, May 23, 2007).

PTTEP has held a Block M9 production-sharing contract with Myanmar since 2003 and holds 100% interest in the block.

Meanwhile, Thai Energy Minister Piyasvasti Amranand has postponed talks with the current Myanmar regime for purchase of gas from the block. The crisis is complicating negotiations, which are not expected to begin any time soon.

However Piyasvasti reiterated Thailand's intention to secure more gas supplies from Myanmar when the kingdom can ensure that any deal will be secure.

Thai officials indicated the talks could wait until PTTEP fully completes its exploration program.

NEB: Canada's gas deliverability to decline

Canadian conventional natural gas deliverability is forecast to decline, Canada's National Energy Board (NEB) said in a recent report.

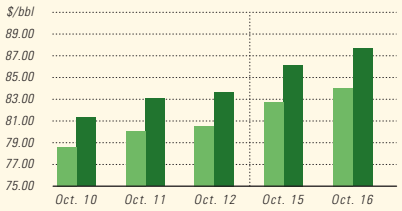
Canada's average gas deliverability is forecast to decrease to 14.5-15.8 bcfd in 2009 from 17.1 bcfd in 2006.

"The drilling pace that sustained Canadian natural gas deliverability is gone for the moment," said NEB Chairman Gaetan Caron.

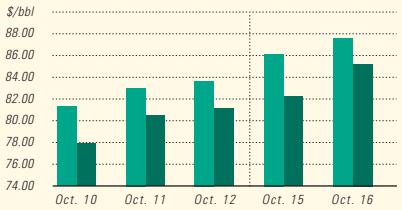
Most Canadian gas resources are in the Western Canada Sedimentary Basin. Production from WCSB has decreased gradually as

Industry Scoreboard

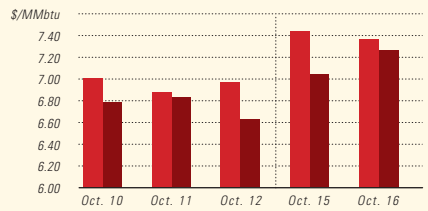
IPE BRENT / NYMEX LIGHT SWEET CRUDE



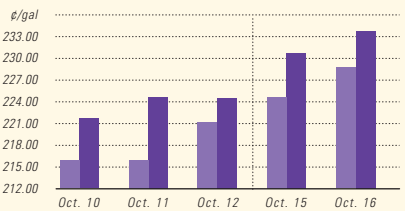
WTI CUSHING / BRENT SPOT



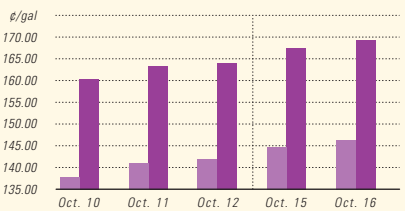
NYMEX NATURAL GAS / SPOT GAS - HENRY HUB



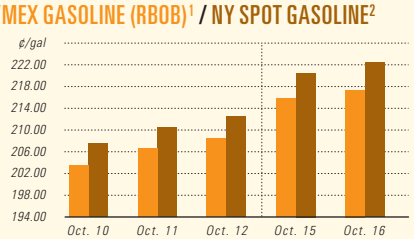
IPE GAS OIL / NYMEX HEATING OIL



PROPANE - MT. BELVIEU / BUTANE - MT. BELVIEU



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



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

US INDUSTRY SCOREBOARD — 10/22

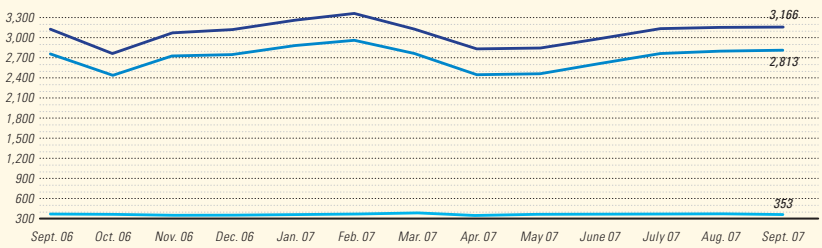
Latest week 10/5	4 wk. average	4 wk. avg. year ago[1]	Change, %	YTD average[1]	YTD avg. year ago[1]	Change, %
Demand, 1,000 b/d						
Motor gasoline	9,201	9,234	–0.4	9,306	9,242	0.7
Distillate	4,210	4,154	1.3	4,215	4,143	1.7
Jet fuel	1,567	1,643	–4.6	1,621	1,638	–1.0
Residual	747	553	35.1	759	709	7.1
Other products	4,819	4,962	–2.9	4,814	4,872	–1.2
TOTAL DEMAND	20,544	20,546	—	20,715	20,669	0.2
Supply, 1,000 b/d						
Crude production	5,047	5,122	–1.5	5,157	5,094	1.2
NGL production[2]	2,363	2,445	–3.4	2,374	2,185	8.6
Crude imports	10,092	10,620	–5.0	10,019	10,196	–1.7
Product imports	3,356	3,645	–7.9	3,517	3,725	–5.6
Other supply[3]	1,036	944	9.7	1,002	1,088	–7.9
TOTAL SUPPLY	21,894	22,776	–3.9	22,069	22,288	–1.0
Refining, 1,000 b/d						
Crude runs to stills	15,273	15,278	—	15,264	15,250	0.1
Input to crude stills	15,464	16,020	–3.5	15,510	15,610	–0.6
% utilization	88.6	92.1	—	89.0	89.8	—

Latest week 10/5	Latest week	Previous week[1]	Change	Same week year ago[1]	Change	Change, %
Stocks, 1,000 bbl						
Crude oil	320,081	321,755	–1,674	330,530	–10,449	–3.2
Motor gasoline	193,000	191,325	1,675	215,397	–22,397	–10.4
Distillate	135,324	135,887	–563	149,946	–14,622	–9.8
Jet fuel-kerosine	41,353	40,846	507	42,192	–839	–2.0
Residual	36,566	37,408	–842	42,879	–6,313	–14.7
Stock cover (days)[4]			Change, %		Change, %	
Crude	21.1	21.1	—	21.2	–0.5	
Motor gasoline	21.0	20.7	1.4	23.4	–10.3	
Distillate	32.1	33.1	–3.0	35.7	–10.1	
Propane	54.7	54.0	1.3	70.7	–22.6	

Futures prices[5] 10/12			Change		Change	%
Light sweet crude, $/bbl	82.08	80.66	1.42	58.14	23.94	41.2
Natural gas, $/MMbtu	6.91	7.25	–0.33	6.10	0.82	13.4

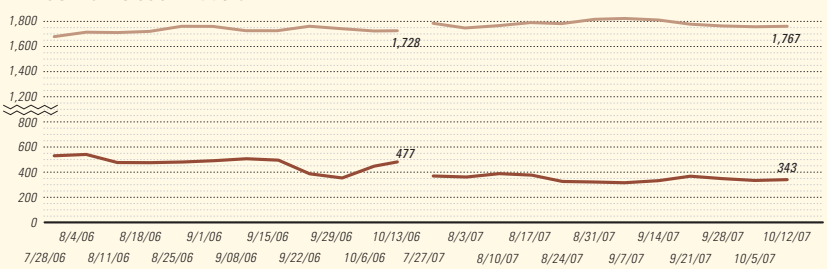
[1]Based on revised figures. [2]Includes adjustments for fuel ethanol and motor gasoline blending components. [3]Includes other hydrocarbons and alcohol, refinery processing gain, and unaccounted for crude oil. [4]Stocks divided by average daily product supplied for the prior 4 weeks. [5]Weekly average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

Drilling-with-Liner (DwL℠) Service Saves $4.5 Million

Offshore Mexico: In this naturally fractured limestone beneath a zone of unstable shale, wells typically require a sacrificial 7½-in. liner through the producing horizon. Weatherford recommended a ***DwL*** operation to reduce open-hole exposure time, eliminate surge and swab forces, minimize lost circulation and increase hole stability.

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the basin matures. WCSB drilling slowed during 2006 because of continued high project costs. Meanwhile, oil sands development projects compete with conventional gas projects for investment dollars.

With less drilling, gas production is starting to decrease. The flow of gas from the maturing WCSB alone is expected to drop to an average of 13.7 bcfd in 2009 from 16.2 bcfd for 2006, NEB said.

Drillers are concentrating on the WCSB's deeper western side, which requires complex, expensive drilling with a potential for large returns.

"We see cause for optimism as deeper drilling and improved techniques help producers deliver tighter gas from deeper wells," Caron said. "In the longer term, Canadians should rest assured that their natural gas needs will be met as other sources, such as unconventional gas, liquefied natural gas, or gas from frontier areas, enter Canada's energy market." ✦

Exploration & Development — *Quick Takes*

Japan, China still in talks over E. China Sea dispute

Japan and China Oct. 11 ended their 10th round of talks aimed at resolving the dispute over gas exploration rights in the East China Sea without reaching any agreement.

There is still a substantial gap between the two sides' positions on the matter, according to Kenichiro Sasae, Japan's main negotiator during the most recent talks in Beijing. Sasae expressed hope that agreement could still be reached this fall, as further talks are due to be held in Tokyo next month.

The disagreement over gas exploration stems from a disputed maritime boundary between the two countries in the East China Sea, where China has already started production in the Tianwaitian area.

In April China said its exploration for oil and gas in the East China Sea does not fall into waters shared with Japan and can be conducted on a unilateral basis (OGJ Online, Apr. 12, 2007).

RWE Dea finds oil in Libya's Sirte basin

RWE Dea AG has tested 393 b/d of oil from its C1-NC193 exploration well in the Sirte basin onshore Libya.

Oil flowed from the Hon formation at 878 m through a 33/64-in. choke. RWE Dea used Adwoc Rig 2 to drill the well. This is the fourth discovery in the Sirte basin.

RWE Dea's acreage covers 30,000 sq km over six concessions. It will continue drilling other promising hydrocarbon prospects in concessions NC194, NC195, and NC197 and will appraise other discoveries in NC193 and NC195.

RWE Dea is the operator with a 100% participation interest in the concessions.

Celtic Sea appraisal well finds oil, gas

An appraisal well on the Hook Head structure in the North Celtic Sea basin off Ireland found 75 ft of net pay in 484 ft of gross hydrocarbons in the main target zone and a combined 20 ft of net pay in three shallower exploration targets.

Providence Resources PLC, Dublin, operator of License 2/07, drilled the well 60 km offshore in 240 ft of water on the crest of a structure penetrated by earlier wells in 1971 and 1975. TD is 4,880 ft true vertical depth.

The four Cretaceous reservoirs had porosities as high as 27% with 30° gravity oil and associated gas.

Providence and partners recovered good quality oil and were hampered in testing by a poor casing cement job. They demobilized the rig due to rig contract time limits and were discussing further appraisal and development drilling early in the 2008 drilling season. The site is 60 km east of Kinsale Head gas field.

Working interests are Providence 43.5294%, Challenger Minerals (Celtic Sea) Ltd. 16.3235%, Dyas BV 16.3235%, Forest Gate Resources Inc. 7.5%, Atlantic Petroleum (Ireland) Ltd. 10.8824%, and Sosina Exploration Ltd. 5.4412%.

PTTEP, Oxy awarded blocks off Bahrain

Thailand's PTT Exploration & Production PLC (PTTEP) has won the bid for Block 2, a 2,228-sq-km tract off northern Bahrain that is said to have to have oil potential.

The formal awarding will take place following negotiation and formulation of an exploration and production-sharing agreement with Bahrain's National Oil and Gas Authority, PTTEP said.

PTTEP will serve as operator with a 100% participation interest.

Separately, Occidental Petroleum Corp. won the bid for two other blocks off Bahrain, while Russia's state-owned Zarubezhneft, a third contender, was unsuccessful for the fourth offshore block, which was offered for right holdings. ✦

Drilling & Production — *Quick Takes*

IOGCC: Marginal wells continue to boost US supply

Marginal wells continue to play an important role in boosting US oil and gas supply, according to the latest report from the Interstate Oil & Gas Compact Commission. In 2006 marginal wells produced nearly 1.03 billion bbl of oil and 14.9 tcf of natural gas, IOGCC said.

The report, "Marginal Wells: Fuel for Economic Growth," also stated that while marginal gas production decreased slightly from the previous year, the number of marginal gas wells rose by 3%. And marginal oil production increased by 4%.

Furthermore, IOGCC's report outlines the economic benefits that these wells create. It said in 2006 states collected more than $1.2 billion in severance taxes from producing marginal wells. On a national level, every $1 million of marginal oil and gas produced creates nine jobs, it said.

However, even at current prices, the small operators which typically run marginal wells find them expensive to maintain, according to the report. In 2006, plugged and abandoned marginal wells

resulted in a loss of $1.77 billion in economic output, $369.2 million in earnings reductions, and 8,223 jobs.

"We must assure that appropriate efforts are made to extend the life of marginal wells so energy from domestic sources will continue to be available," said Roy Edwards, executive director of the Oklahoma Marginal Well Commission, which cofunded the report.

IOGCC Acting Executive Director Gerry Baker said, "The states, industry, and federal government must work together to make certain marginal well operators and the states that regulate them have the information and tools necessary to ensure they are not prematurely abandoned."

Colorado gas plant catches CO_2 for EOR

Blue Source LLC announced the startup of a carbon dioxide reduction, carbon offset project at the Apple Tree LLC gas processing plant in Huerfano County, Colo.

The CO_2 is being sold for use in enhanced oil recovery in the Permian basin. A carbon capture and storage (CCS) developer, Blue Source said the Apple Tree gas plant is at the foothills of the Rocky Mountains near La Veta, Colo.

Gas produced from Oakdale field is 22% methane and 78% CO_2. The gas is separated using membrane modules. Before start of the CCS project, CO_2 was vented into the atmosphere. The CCS project is reducing CO_2 emissions by about 400,000 tonnes/year.

On Oct. 8, Blue Source announced CO_2 was captured from the vent stack and transported via the Sheep Mountain CO_2 pipeline to be used for EOR projects. The Apple Tree vent stack and an associated 16-mile pipeline cost $8 million, Blue Source said.

"This will further help produce a considerable amount of domestic oil in underused oil fields," said Russell Martin, Blue Source executive vice-president. He said confidentiality agreements prevent Blue Source from naming CO_2 buyers or outlining EOR projects.

Apple Tree Holdings LLC is managed by Manzano LLC of Roswell, NM. ✦

Processing — *Quick Takes*

Chevron to upgrade Pascagoula refinery

Chevron USA Inc. plans to invest $500 million to build a continuous catalyst regeneration (CCR) unit at its 325,000 b/cd refinery in Pascagoula, Miss.

Project construction is scheduled to begin in early 2008, with completion anticipated by mid-2010. The company already has secured environmental permits.

The CCR unit, which replaces two older units, will improve equipment reliability and utilization, and allow the refinery to optimize product yields. The refinery's oil capacity will remain the same, but its gasoline production is expected to increase by about 10%, or 600,000 gpd.

This increase in gasoline production follows a previous increase of 10% to about 5.5 million gpd of gasoline production that was realized when the company brought online its fluid catalytic cracking unit in late 2006 (OGJ Online, Dec. 19, 2006).

Separately, Chevron announced that after further damage assessments of an Aug. 16 fire at the Pascagoula facility, it expects refinery repairs to be completed during first quarter 2008.

The fire damage was largely isolated to the refinery's No. 2 crude unit. Plans and preparations for the repairs are under way. Additional conversion units, which were already off line for planned turnaround activities, have been recommissioned to increase the production of gasoline and distillates from the facility.

The company is utilizing its system of manufacturing plants and downstream infrastructure to minimize supply disruptions, and it said it expects to continue to meet all of its supply requirements and customer product commitments.

Chevron, in coordination with the appropriate local, state, and federal agencies, is still in the process of conducting a thorough investigation of the cause of the fire. There were no injuries related to the fire.

Pakistan approves Khalifa Point refinery near Hub

Pakistan has approved construction of the $4-5 billion coastal refinery project at Khalifa Point near the Hub area of Balochistan province.

Ashfaq Hassan Khan, briefing adviser to the finance ministry, said preliminary work has begun on the refinery, which will have a capacity of 200,000-300,000 b/d.

The facility would be established as a 74:26 joint venture of Abu Dhabi-based International Petroleum Investment Co. (IPIC) and Pak-Arab Refinery Co. The project is expected to be completed and commissioned by first quarter 2011.

The Ministry of Petroleum and Natural Resources was authorized to sign the implementation agreement with IPIC within a month.

Various concessions had been announced for the project, including a 20-year tax holiday, exemption from 5% workers' profit participation, and exemption from 0.5% services charges under the export processing zones rules.

Pakistan also advises Oil & Gas Development Corp. to dedicate at least 80% of the liquefied petroleum gas produced from Chanda field for distribution in the Federally Administered Tribal Areas of northern Pakistan.

QP lets petrochem contracts for Mesaieed complex

Qatar Petroleum subsidiary Qatar Intermediate Industries Holding Co. Ltd. has awarded contracts to two subsidiaries of Foster Wheeler's Global Engineering & Construction Group for work on a proposed grassroots petrochemical complex at Mesaieed, Qatar.

One contract calls for Foster Wheeler to execute the front-end engineering and design, while the other is to provide project management and construction management services. Foster Wheeler said its work also includes procurement of long-lead items.

For this project, Qatar Holding is establishing a joint venture company with South Korea's Honam Petrochemical Corp.

The firm said the new complex, slated for completion in 2011, will include world-scale olefins and aromatics units, which will supply ethylene, propylene, and benzene to the downstream polypropylene, ethylbenzene, styrene monomer, and polystyrene facilities.

GCC's refining capacity to rise 45% by 2010

The total refining capacity of the six Gulf Cooperation Council (GCC) countries is expected to increase by 45.5% in 2010—to 6.3 million b/d from 4.33 million b/d, according to a report by the Emirates Industrial Bank (EIB).

"The potential increase is a result of four new refineries planned in Kuwait, Saudi Arabia, Qatar, and Oman, as well as of renovating old refineries and increasing their production capacity in the UAE and Kuwait," it said.

EIB noted that while the GCC's oil production currently comprises 19% of world output, the current capacity of the group's 20 existing refineries constitutes just 5% of the world's overall refining capacity of 85.4 million b/d.

The report blamed the lack of refining capacity around the world for the reduced supply of products and their consequent high costs. "The rise in the cost of oil refining and the closure of 15 refineries in the world have led to a shortage in oil products...in the past 3 years," it explained.

"The rise in oil refining capacity in some countries has contributed to curbing this gap, which eventually helped in curbing oil prices and creating huge inflation rates in world countries, including oil producing and exporting countries," EIB said.

GCC member countries are Bahrain, Kuwait, Qatar, Oman, Saudi Arabia, and the UAE. ✦

Transportation — *Quick Takes*

Sakhalin-2 receives LNG for plant testing, startup

Sakhalin Energy Investment Co., operator of the Sakhalin-2 project, has received a second shipment of LNG for use in testing and start-up operations at its gas liquefaction plant on Sakhalin Island.

The company said it took a day to offload Marathon Oil Corp.'s Arctic Sun shipment of 85,000 cu m of Alaskan LNG into two LNG storage tanks at Prigorodnoye on southern Sakhalin Island.

Sakhalin Energy said the primarily methane Alaskan LNG is "ideally suited" for commissioning and testing the LNG facility. It said the process began in July, with the initial shipment of LNG delivered from Indonesia.

Sakhalin Energy said the Arctic Sun would return to its normal duties in Alaska, where, along with its sister ship the Polar Eagle, it normally transports LNG to Japan. The firm did not say why the sourcing shifted to Alaska from Indonesia.

The arrival of the Alaska LNG came just days after a naming ceremony Oct. 4 for two new 147,000 cu m LNG carriers—the Grand Elena and Grand Aniva—at Mitsubishi Heavy Industries Ltd.'s Nagasaki facility.

The two carriers were built for a Japanese-Russian joint venture of Nippon Yusen Kabushiki Kaisha (NYK Line) and Russia's state-owned JSC Sovcomflot under a contract awarded Nov. 15, 2004.

Sakhalin Energy has chartered the carriers long-term to deliver LNG to customers in Asia-Pacific. The two tankers are ice-strengthened and designed to operate at low temperatures to ensure year-round operations from Sakhalin.

Earlier this month, the Russian government announced plans to build a new port at Ilyinsky on Sakhalin Island to export oil and gas from offshore fields (OGJ Online, Oct. 1, 2007).

Meanwhile, an environmental impact report, produced by AEA Technology for potential lenders to the Sakhalin-2 oil and gas development project in Russia's Far East, gave an overall green light, with some reservations, to the project.

Prior to the report's publication, Russian Natural Resources Minister Yuri Trutnev said he would travel to Sakhalin "around November" to assess the situation.

Gassco starts gas flow through Tampen Link

Gas deliveries to the UK have started from the Anglo-Norwegian Statfjord field via the Tampen Link pipeline, which came on stream on Oct. 12.

Norwegian pipeline operator Gassco AS said the 23.1-km, 32-in. Tampen Link line will transport 25 million cu m/day and will tie Statfjord into Britain's existing Flags system, which extends to St. Fergus, Scotland.

Gassco is operator for Tampen Link, which was incorporated in the company's integrated network on Sept. 1.

The Statfjord partners will convert three Statfjord field platforms from handling oil with associated gas, to handling gas with associated oil. The work enables Statfjord to continue Statfjord production to 2020, with partners investing just over $2.7 billion.

Statfjord field's late-life additional resources are estimated at 32 billion cu m of gas, 25 million bbl of oil, and 60 million bbl of condensate. The expected recovery ratio is as high as 70% for oil and 75% for gas.

Urals gets Transneft approval for ESPO line tie-in

Urals Energy, Nicosia, said it received approval from Russia's state-run OAO Transneft to build a pipeline tie-in from its Dulisminskoye field to the Eastern Siberia Pacific Ocean (ESPO) pipeline.

Following approval of proposed technical designs and projected construction work, Urals said it intends to commence field preparation work in the fourth quarter.

The Dulisminskoye field in Eastern Siberia is estimated to have 464 million boe, and is projected to produce 30,000 b/d by 2011. First oil from the field is expected to flow into Transneft's ESPO in the first half of 2009.

In late September, Russia's Natural Resources Ministry dropped accusations of falsifying hydrocarbon estimates against Urals Energy.

Following an appeal by Urals, the ministry working group confirmed estimates supplied by the company to the State Reserves Commission exceeded the DeGolyer and MacNaugton estimate by 30%.

Urals expects production to reach a minimum of 12,000 b/d of oil by the end of 2007, instead of its previously announced target of 15,000 b/d, which it now expects to reach by mid-2008. Urals' output was reduced by a disappointing performance at its onshore field on Sakhalin Island and by repairs to the pipeline used to transport oil from its Dulisminskoye field. ✦


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Letters

Well-cost estimates

As the director of statistics at the American Petroleum Institute, I read with great interest the recent articles about estimating drilling costs (OGJ, Aug. 6, 2007, p. 39; Aug. 13, p. 46; Aug. 27, p. 39). I was surprised that the authors, writing about API's Joint Association Survey on Drilling Costs (JAS), did not take the time to talk with us. Had they done so, they would have learned that API's models are extremely accurate in predicting well costs, with R^2 usually ranging from 0.81 to 0.94. In fact, in the Gulf of Mexico, where the authors did their in-depth study, API's 2005 model has an R^2 of 0.89 with an error of only 2%.

For over half a century, API has relied on publicly available data, as well as actual well costs provided by hundreds of operators, to estimate drilling costs for the entire US. As a result, the JAS contains drilling costs by area where data is tabulated per well type and well class, breaking out horizontal, sidetrack, CBM, and offshore wells.

While we always welcome new and creative methodologies, the JAS's track record and thorough reporting remain unmatched.

Hazem Arafa
Director, Statistics Department
American Petroleum Institute
Washington, DC

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.

2007

OCTOBER

SPE/IADC Middle East Drilling and Technology Conference, Cairo, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 22-24.

World Energy & Chemical Exhibition and Conference, Kuwait City, +32 2 474 8264, +32 2 474 8397 (fax), e-mail: d.boon@bruexpo.be, website: www.wecec-kuwait.com. 22-25.

Annual Natural Gas STAR Implementation Workshop,

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Houston, (781) 674-7374, e-mail: meetings@erg.com, website: www.epa.gov/gasstar. 23-24.

Louisiana Gulf Coast Oil Exposition (LAGCOE), Lafayette, (337) 235-4055, (337) 237-1030 (fax), website: www.lagcoe.com. 23-25.

Pipeline Simulation Interest Group Annual Meeting, Calgary, Alta., (713) 420-5938, (713) 420-5957 (fax), e-mail: info@psig.org, website: www.psig.org. 24-26.

GSA Annual Meeting, Denver, (303) 357-1000, (303) 357-1070 (fax), e-mail: gsaservice@geosociety.org, website: www.geosociety.org. 28-31.

Expandable Technology Forum, Reims, +44 (0) 1483 598000, e-mail: info@expandableforum.com, website: www.expandableforum.com. 30-31.

Asia Pacific Oil and Gas Conference and Exhibition, Jakarta, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. Oct. 30-Nov. 1.

Chem Show, New York City, (203) 221-9232, ext. 14, (203) 221-9260 (fax), e-mail: mstevens@iecshows.com, website: www.chemshow.com. Oct. 30-Nov. 1.

Methane to Markets Partnership Expo, Beijing, (202) 343-9683, e-mail: asg@methanetomarkets.org, website: www.methanetomarkets.org/expo. Oct. 30-Nov. 1.

NOVEMBER

IADC Annual Meeting, Galveston, Tex., (713) 292-1945, (713) 292-1946 (fax), e-mail: info@iadc.org, website: www.iadc.org. 1-2.

Annual U.S. – Canada Energy Trade & Technology Conference, Boston, (781) 801-4310, e-mail: ellenrota@aol.com, website: www.necbc.org. 2.

Deepwater Operations Conference & Exhibition, Galveston, Tex., (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.deepwateroperations.com. 6-8.

IPAA Annual Meeting, San Antonio, (202) 857-4722, (202) 857-4799 (fax), website: www.ipaa.org/meetings. 7-9.

Regional Mangystau Oil & Gas Exhibition & Conference, Aktau, +44 207 596 5016, e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 7-9.

GPA North Texas Annual Meeting, Dallas, (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@gasprocessors.com, website: www.gasprocessors.com. 8.

GPA North Texas Annual Meeting, Dallas, (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@gasprocessors.com, website: www.gasprocessors.com. 8.

SPE Annual Technical Conference and Exhibition, Anaheim, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 11-14.

World Energy Congress, Rome, +39 06 8091051, +39 06 80910533 (fax), e-mail: info@micromegas.it, website: www.micromegas.it. 11-15.

API/NPRA Fall Operating Practices Symposium, San Antonio, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org. 13.

Houston Energy Financial Forum, Houston, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.accessanalyst.net. 13-15.

Turkemenistan International Oil & Gas Conference, Ashgabat, +44 207 596 5016, e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 14-15.

Annual Unconventional Gas Conference, Calgary, Alta., (866) 851-3517, e-mail: conference@emc2events.com, website: www.csugconference.ca. 14-16.

Australian Society of Exploration Geophysicists International Geophysical Conference & Exhibition, Perth, (08) 9427 0838, (08) 9427 0839 (fax), e-mail: secretary@aseg.org.au, website: www.aseg.org.au. 18-22.

ERTC Annual Meeting, Barcelona, 44 1737 365100, +44 1737 365101 (fax),

Calendar

e-mail: events@gtforum.com, website: www.gtforum.com. 19-21.

Asia Pacific Natural Gas Vehicle Conference & Exhibition, Bangkok, +66 0 2617 1475, +66 0 2271 3223 (fax), e-mail: angva@besallworld.com, website: www.angvaevents.com. 27-29.

DryTree & Riser Forum, Houston, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.drytreeforum.com. 28.

IADC International Well Control Conference & Exhibition, Singapore, (713) 292-1945, (713) 292-1946 (fax), e-mail: info@iadc.org, website: www.iadc.org. 28-29.

DECEMBER

International Oil and Gas Industry Exhibition & Conference, Suntec, +44 (0)20 7840 2100, +44 (0)20 7840 2111 (fax), e-mail: osea@oesallworld.com, website: www.allworldexhibitions.com. 2-5.

Middle East Nondestructive Testing Conference & Exhibition, Bahrain, +973 17 729819, +973 17 729819 (fax), e-mail: bseng@batelco.com.bh, website: www.mohandis.org. 2-5.

International Petroleum Technology Conference, Dubai, +971 4 390 3540, +971 4 366 4648 (fax), e-mail: iptc@iptcnet.org, website: www.iptcnet.org. 4-6.

IADC Drilling Gulf of Mexico Conference & Exhibition, Galveston, Tex., (713) 292-1945, (713) 292-1946 (fax), e-mail: info@iadc.org, website: www.iadc.org. 5-6.

Oil & Gas Maintenance & Technology Conference & Exhibition, Manama, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.oilandgasmaintenance.com. 9-13.

Pipeline Rehabilitation & Maintenance Conference & Exhibition, Manama, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.oilandgasmaintenance.com. 9-13.

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.

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JANUARY

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

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

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

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

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

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

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

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

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

FEBRUARY

Middle East Corrosion Conference, Bahrain, + 973 17 729819, + 973 17 7299819 (fax), e-mail:

bseng@batelco.com.bh, website: www.mohandis.org. 3-6.

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

SPE Heavy Oil Challenge: Completion Design and Production Management Forum, Sharm El Sheikh, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 9-13.

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

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

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

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

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

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

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

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

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

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

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

Middle East Refining Conference & Annual Meeting, Abu Dhabi, +44 (0) 1242 529 090, +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. 25-26.

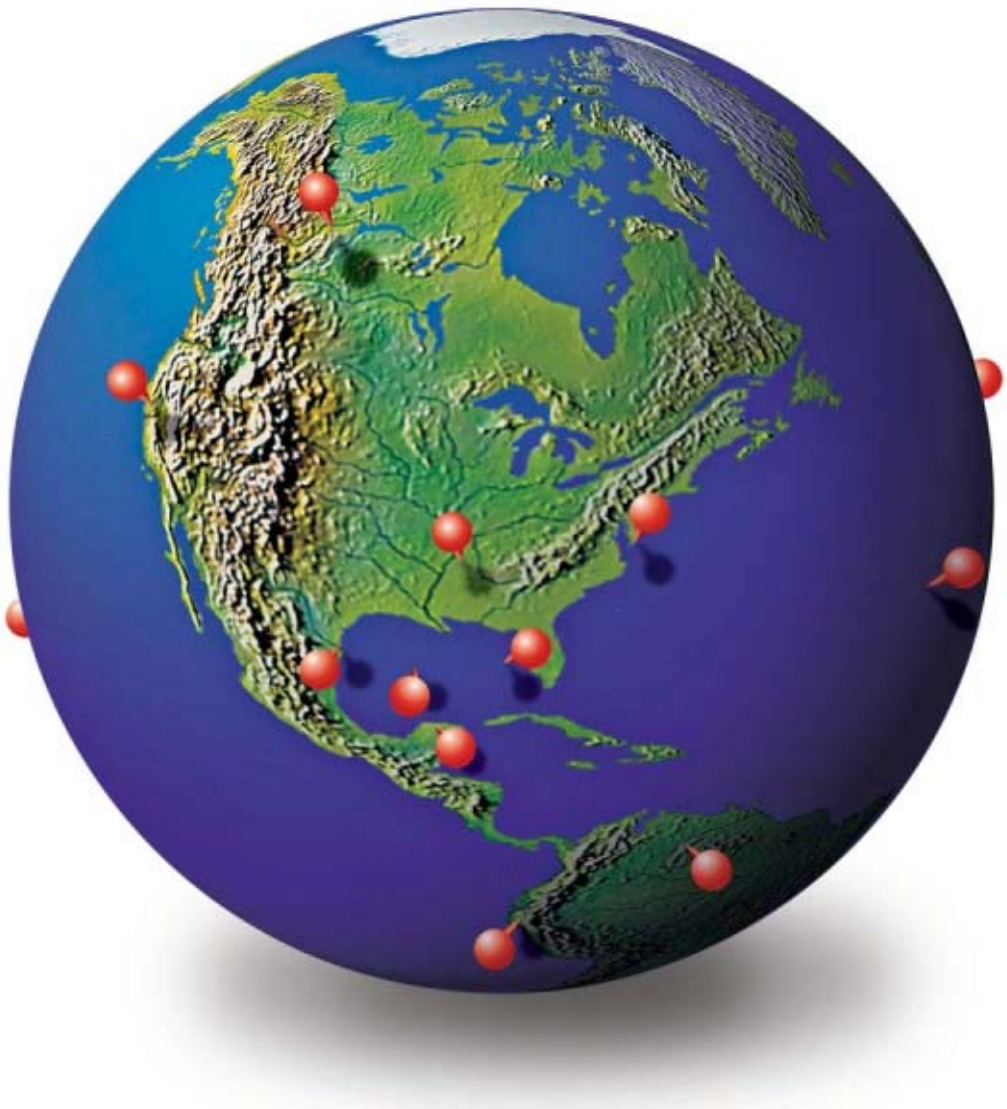
SPE Intelligent Energy Conference & Exhibition, Amsterdam, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 25-27.

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

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

MARCH

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



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A propensity to recycle

Christopher E. Smith
Pipeline Editor

Simply crossing the street from hotel side to beach side on Rio de Janeiro's Copacabana unveils any number of unique cultural attributes. These include a nearly untempered propensity toward recycling.

Four midsize waste bins stand outside each food pavilion or other likely gathering spot. One is labeled plastics, the next aluminum, another paper, and yes, there is still one called trash. And people actually use them. They pause long enough to put their beverage can in one hole, their napkin in another, and their plate and cutlery in a third, leaving only the corn husks or coconut shell or sandwich remnant for bin number four.

The pause is paying off. Brazil recycles 45-47% of all the paper, tires, and glass it consumes each year. The country's success in recycling aluminum (96.2% of all beverage cans) prompted Alcoa and its partners to site the world's first aseptic carton recycling plant there in 2005.

The entrepreneur

More than a cultural predilection, or a chance for large companies to do good business, recycling Brazilian-style is also an entrepreneurial opportunity. More than 160,000 people make more than minimum wage by selling gathered aluminum cans at a price of R$3.30/kg (roughly 70 cans). The middle-men they sell these to sell them to a still larger entity, until eventually the recycling plant is reached.

Elcio Soares Reis, a Copacabana street vendor by day, spends his nights transferring this business model to the still locally lagging world of plastics recycling. He and his business partner buy plastic at R$0.25/kg from collectors. They then sort it and resell it at R$0.65-1.25/kg, depending on quality.

The two men plan to buy a press (R$30,000-50,000) to increase the volume and efficiency of their operation. Soares expects it will take a year to save the lower end of the range, but he'd rather reach the upper end (or beyond) and use any money left over to establish a payroll cushion, buy a used truck, or both.

After acquiring the press, a purchase the Brazilian government will help offset through tax breaks, Soares and his partner will approach private condominium buildings and clubs along the Copacabana and offer to remove all their waste if they simply separate the plastic. This scheme is not without precedent, many condos and clubs having already taken to separating their aluminum cans from the rest of their waste.

Soares estimates that each condo or club generates 1-3 tonnes/week of plastic waste and that the typical Copacabana block generates 10 tonnes/week. He conservatively translates this into revenue of R$3,000/week/block, while noting that some individual buildings could well generate that much on their own.

Bigger picture

At a time when hydrocarbon fuels are at or near all-time high prices it is in the interest of not just the bulk of individuals, but also the bulk of businesses and the bulk of nations, to make sure that resources are being used as efficiently as possible. It is similarly important that these resources be devoted to areas in which substitution is either technologically or economically difficult (transportation), while other areas in which substitution is somewhat easier (base goods manufacturing) pursue whatever technical and economic advantages can be found in substitution.

Recycling plastics is a double winner. It not only allows the earth's hydrocarbon resources to be dedicated increasingly to other areas, but the act itself is generally less energy-intensive than manufacturing plastics from new source materials. Given the pervasiveness of plastics in modern life, both consumers and finished goods manufacturers will want to obtain any plastics they need as cheaply as possible.

Plastics manufacturers, meanwhile, are driven by their bottom lines to find the least expensive avenue to meet demand for their products.

Economies of scale and integration might mean for some that this continues to be done by turning raw materials into plastics. But as the cost of raw materials continues to rise, the economic opportunities presented by recycling will become more attractive to everyone: from Soares to the fully integrated supermajors. ✦

Editorial

Energy in the shadows

It would have been naive to hope energy bills passed by the House and Senate might die because no one got around to reconciling them. Still, open deliberation shouldn't be too much to ask. House Speaker Nancy Pelosi (D-Calif.) instead will take the legislation into shadows so no one can see how politicians make decisions about who profits and who pays when they tinker with energy.

For Pelosi, energy is "a flagship issue" that comes down to "energy security and reversing global warming." Never mind the erosion of support for a conference to address differences among bills passed under those banners. "With or without a conference," she says, "we will proceed."

Raising prices

In case anyone needs reminding, the bills would, among other things, raise taxes on oil companies, fortify subsidies for renewable fuels, force holders of federal offshore leases bungled by the government to renegotiate on government terms, expand the mandate for ethanol in vehicle fuel, undermine efforts to streamline drilling approvals, and outlaw "unconscionably excessive" oil prices in supply emergencies. They would, in other words, crimp supply of commercial energy and raise prices of energy overall.

While security and global warming are legitimate concerns, they too easily become tools of extremism. To Pelosi, energy security means replacing oil with costlier alternatives. And the speaker doesn't want simply to moderate warming influences by limiting emissions of greenhouse gases. She wants to reverse global warming. If human activity really accounts for most of the warming observed in the past century, reversing the trend would require emission cuts far greater than anyone has proposed. To pretend that the costs of such a response can be made bearable is disingenuous.

Pelosi might want mostly to produce a bill President Bush will have to veto. Then she can complain that the Democrats tried to act on energy only to meet Republican obstructionism.

But even veto bait needs a veneer of legitimacy. There's nothing legitimate about forcing people to render economic sacrifice to hopeless targets. Replacing cheap with costly energy does not yield security; it creates hardship. And trying to reverse global warming is a sure way to dissipate human welfare in a quest that might be futile.

Alas, Congress is in no mood to ponder hard energy questions. Most lawmakers will see no political advantage in resisting Pelosi's worst lurches. Energy consumers can only hope Bush is in no mood to split differences with lunacy.

Pelosi has improbable ways to tether her ambitions, however tenuously, to physical and economic reality. On energy security, she could call for more federal oil and gas leasing. Reversing her longstanding position on this issue would acknowledge that the fastest and most economical route to improved US energy security is increased US production of oil and gas. It would acknowledge, in fact, that anyone who claims to support energy security while resisting leasing or otherwise limiting domestic oil and gas production is trapped in hopeless contradiction.

Escape contingency

With global warming, Pelosi could give energy consumers an escape contingency. Some scientists think the world might be approaching the peak of a mostly natural warming cycle. Some even expect cooling to become evident within the next 5-10 years. The activists who inform Pelosi will hear none of that. But what if the trend in global average temperature flattens in the next few years? It wouldn't necessarily signal the end of observed warming. But it would be enough to throw doubt on the need for costly precautions that only then would be taking effect.

Would Pelosi support a provision in global warming legislation that promised to relax emission controls—and relieve consumers of the costs—if temperature data raised questions about the need? Well, no, she wouldn't. Such a provision, like leasing support in a security initiative, would clash with Pelosi's apparent commitment to senseless cost. But measures like these would be signs now missing from US energy discussions of concern for consumer effects, which relate inevitably to seriousness of intent. ✦

Improved process can cut risk in reserves reporting

Charles Swanson
Ernst & Young
Houston

Ron Harrell
Ryder-Scott Petroleum Consultants
Houston

US Securities and Exchange Commission (SEC) director John White recently announced the commission's intentions to hire an Engineering Fellow to evaluate its reserves disclosure rules and determine whether changes need to be made. While the industry awaits the outcome of the SEC's analysis, Ernst & Young and Ryder Scott Petroleum Consultants offer four steps oil and gas companies can take to improve the reserves estimating process and reduce company risk.

A few years ago, legislators, think tanks, investors, consultants, and representatives from oil and gas companies began scrutinizing rules the companies have been following for 3 decades. There was no shortage of opinions, yet there resulted little consensus as to how the rules should or should not change.

Despite years of public discourse, it appears that no major changes will occur any time soon. While many companies would prefer to see changes in the rules requiring disclosure of oil and gas reserves estimates, most companies seem content to live with the existing rules.

Not formalizing a process for estimating and reporting reserves can greatly increase the risk of restatements and the fallout they cause.

Why this display of patience? Primarily, it stems from the fact that, internally, most oil and gas companies have a very different view of their reserve positions. Within the company, they use oil and gas reserve estimates to make investment and operating decisions that can vary significantly from the reserves that must be disclosed under SEC guidelines.

This raises the question: Who has the better oil and gas information? Right or wrong, the companies believe that they do—a view that tempers any pleas for changes in the SEC's oil and gas reserve disclosure guidelines. At the same time, financial auditors have neither reason nor the responsibility to push for changes in reserves disclosures. The SEC, as steward for the shareholder, appears to have little motivation for change. It appears to embrace the view that conservatism and comparability are particularly important in this matter.

However, as the discourse continues, the energy professionals at Ernst & Young and Ryder Scott suggest that oil and gas companies continue to shift their focus to the process that governs how the rules are interpreted, taught, applied, and documented in their organizations. The real lesson of the past few years is that many companies have not formalized the process for estimating and reporting reserves, which can greatly increase the risk of restatements and the fallout that they cause.

There are four steps oil and gas companies can take to mitigate this risk and restore confidence in how they report the most important asset they have: hydrocarbons in the ground.

Define

The first step in formalizing a process for reserves estimation and reporting is to define and record clearly how the rules will be interpreted and applied in the company. To some, this may seem counterintuitive. After all, rules are rules, right? In truth, like many other accounting regulations, these rules are often open to interpretation, with a large amount of gray area between the black and the white.

To illustrate this point, consider the SEC, which enforces the accounting and financial reporting standards that it developed along with the Financial Accounting Standards Board (FASB). SEC regularly issues guidance and interpre-

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tations of these standards as new questions arise, because standards dealing specifically with oil and gas accounting and financial reporting were issued during 1977-82—before the emergence of new technologies and market dynamics that led to specific questions of interpretation. This is similar to the relationship between the US Constitution and the US Supreme Court, which issues 80-90 formal written opinions each year clarifying how the Constitution applies to modern-day situations that its authors could not have imagined.

The sometimes-subjective nature of the rules, however, does not give companies a license to interpret them to their benefit on a case-by-case basis. Historically, SEC has looked favorably on companies that adopt the most conservative interpretations and stick to them, regardless of how they impact reserves estimates. Companies that opt for conservatism and apply the rules in a consistent manner have already taken a major step in avoiding unexpected downward revision in their oil and gas reserve estimates.

Assign

Ask three oil and gas companies who prepares their reserves estimates and you're likely to get three different answers—or more, if you ask 2 years in a row. Unlike other key functions in oil and gas companies, there is little consistency in who is responsible for this important function:

- In general, larger companies view reserve estimates as a full-time job with a dedicated staff that spends the majority of its time on this process.
- The smaller the company, the more it is viewed as a part-time, once-a-year endeavor.
- For companies with multiple reservoirs scattered about the globe, the process is often highly decentralized, with asset teams accountable for estimates of their specific properties. The result can be different processes used to evaluate properties within the same company.

Events of the past few years have demonstrated that estimating reserves is a process important enough to warrant a more thoughtful, uniform approach. Indeed, more companies are forming dedicated teams using a consistent, centralized process to prepare estimates for all of the company's reserves.

This is an encouraging development that more companies should consider.

Oil and gas companies also should examine how much the measurement of company reserves affects the compensation of those responsible for estimating the reserves. Frequently, oil and gas companies base a portion of annual employee bonuses on reserves growth and replacement. While this makes sense because these metrics play a major role in projecting the company's future cash flows and earnings, it creates an obvious conflict of interest for those charged with estimating this measure. Clearly, it's not advisable to tie such metrics to compensation.

"Historically, SEC has looked favorably on companies that adopt the most conservative interpretations and stick to them..."

Certainly, the estimate of an oil and gas company's most valuable asset should be subject to stringent review. Once it's determined who is charged with estimating reserves, it's equally important to assign someone to review and approve the initial estimates.

Whether a second opinion is rendered by an outside reserves engineer or a group within the company is less important than the reviewers' qualifications and independence. In a recently published survey by John S. Herold, 82% of producers that identified sources of reserves estimates said they use third-party consultants.

Because of the increased awareness by investors and others of the serious consequences of faulty estimates, it's likely that more companies will turn to outsiders either to prepare initial estimates, review the findings of internal teams, or resolve internal disagreements. Doing so is an excellent way to mitigate the risks inherent in this highly technical—and often highly subjective—evaluation of geological, engineering, and economic data.

Train

Assigning the important task of estimating oil and gas reserves is only half of the human resources equation. The other is equipping personnel to do the job properly.

Currently, there are no statutory requirements in the US relating to the qualifications of employees preparing oil and gas reserves estimates for public companies. Additionally, the relatively few state-licensed engineers who may be involved in this work are not required to sign the reserves reports that are filed with the SEC.

One can argue that the engineers and geoscientists charged with preparing reserves estimates for their employers or clients have a professional responsibility to seek competent training within their companies or through other industry training sources. Unfortunately, this is not always the case.

Regulators, investors, and others who use reserves information assume that companies have established internal standards and requisite training. As a result, they have nothing more than a company's word that those estimating its oil and gas reserves have been properly trained. For some companies, particularly larger ones, that's a safe assumption, as they have developed rigorous and thorough educational and training standards. For many smaller organizations, however, qualifications may be lacking.

Failure to have properly trained and experienced personnel is unfair to the employees and to investors, and is an enormous risk that no company can afford. At the minimum, companies

should require formal education in the appropriate technical field (petroleum engineering, geophysics, or geology), a minimum number of years of industry experience, and a certain amount of training specific to reserves evaluation. This training can be based on an internally developed curriculum, courses offered by consultants or professional and industry organizations, or a combination thereof.

> *"Lessons learned from documenting, testing, and evaluating internal controls and procedures for financial reporting are ideally suited for transfer to operational processes."*

Despite the presence of excellent training programs at a limited number of companies, training within many E&P companies and consulting firms can be inconsistent and may not be suitably substantial in terms of the depth of its content and reach within the company. The industry's failure to maintain sufficient in-depth training of qualified individuals, in order to consistently produce reserves estimates that meet the needs of investors and regulators, has led some to call for an industry-wide certification program. This is an idea whose time has come and would be another step forward in minimizing the risk associated with estimating oil and gas reserves.

Document

It's apparent through our work with oil and gas companies that failure to document the steps taken in estimating reserves is often at the root of related problems.

For example, it's not uncommon for an organization to produce reliable reserves estimates by highly qualified people but fail to keep a record of how the estimates were produced. Then, when faced with an inquiry into the foundation of the estimates, management embarks on a mad scramble to recreate months of labor because the original work product lies scattered across the organization on hard drives, in e-mails, on the back of a napkin, or in someone's head.

Failure to document reserves estimates can also cause problems when key personnel involved in the process leave the organization, taking with them significant amounts of institutional knowledge, and making their replacements' jobs unnecessarily difficult.

Perhaps it's best to remember and follow the advice of high school algebra teachers: "Show your work!" Collect all oil and gas reserve estimation data in a central repository, and back it up with paper and electronic copies.

Documenting all work is also the first step in developing a process that mitigates risk and makes reserves-estimating more efficient. Only by documenting how tasks are accomplished now can management construct a vision of how they should be accomplished in the future. It's similar to using a map to reach your destination. The first step is identifying where you are. If you're unable to do that, it will be impossible to get where you want to be.

By necessity, public companies have recently gained much experience documenting and developing processes through implementation of the requirements of Sarbanes-Oxley Section 404. While many companies may still be catching their breath from meeting recent compliance deadlines and likely are not eager to rush back into a 404-like documentation process, doing so would solve many problems.

The lessons learned from documenting, testing, and evaluating internal controls and procedures for financial reporting are ideally suited for transfer to operational processes. Failure to transfer this knowledge would be a missed opportunity to strengthen and improve a process that recent headlines would suggest is in significant need of attention. ✦

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GENERAL INTEREST

'Politics of fear' seen as discounting energy politics

A.F. Alhajji
Ohio Northern University
Ada, Ohio

Washington politics is no longer about issues. It is about fear. To succeed, a politician has to play on the public's fears, most of all fear of terrorism and fear of global warming.

Republicans capitalized on fear of terrorism in 2002 and 2004 to win national elections. Democrats chose fear of global warming, and they have experienced political success with it. Strangely enough, both groups, riding a platform of fear, come to the same conclusion: Oil is the enemy. For Republicans, oil finances terrorism. For Democrats, oil causes global warming. For both, dependence on oil is a disaster in the making.

A third group, mostly but not exclusively Democrats with neoconservative attitudes—let's call them Republocrats—has also called for eliminating dependence on oil to foster democracy in the Middle East. They believe that eliminating dependence on oil will lower prices and decrease the flow of money to Middle Eastern governments' coffers. According to this view, lower oil revenues will force governments to be more democratic.

The three groups that dominate American politics now have a single enemy: oil. For all of them, if you eliminate dependence on oil, you solve the world's most pressing problems: terrorism, global warming, and dictatorship.

I wish it were that easy.

Fear of terrorism, global warming, dictators, and consequently of oil has allowed politicians to spend billions of dollars to promote substitutes for oil. This spending has in turn created new and powerful industries that thrive as long as their oil-bashing supporters are in power. Amazingly, even the private sector has launched a war against oil.

Energy a top issue

It has become fashionable in Washington, DC, to talk about energy, to bash the oil companies, to suggest higher taxes on gasoline, to propose windfall profit taxes on the oil companies, and to blame the Organization of Petroleum Exporting Countries for all the ills in the US. Even President George W. Bush has called for eliminating the nation's "addiction to oil."

After many flip-flops on oil, Bush has promoted soy biofuel, corn ethanol, cellulosic ethanol, clean coal technology, and hydrogen. Congress has passed a bill that changes US antitrust law in a way that allows lawsuits against OPEC, even though energy experts agree that refinery problems in the US caused the increase in gasoline prices toward the end of spring and beginning of the summer, not OPEC.

The high price of gasoline and of other energy products is important, but politicians have shunted aside other more significant issues in favor of energy, a surefire winner at the polls. They "Wal-Martize" the discourse when they effectively turn aside from pressing issues such as the war in Iraq, terrorism, and health care in favor of a less important issue: energy. Wal-Mart attempts to reach the widest possible customer base with low prices on products that everyone buys. So too, American politicians, along with politicians in Europe and Asia, are reaching for the widest possible constituency by promoting an issue that affects everyone: energy. No issue offers a larger customer base than the increasing cost of energy, which everyone feels every day.

It seems that politicians in Washington have adopted Wal-Mart's policy: Discount the issues to attract more people. The war in Iraq does not touch the lives of everyone. Energy does. The people that terrorism affects are a small fraction of the population of Western countries. Energy touches the lives of everyone, including those who do not drive but still need transportation and energy-dependent goods and services.

Just one example: Energy touches the lives of millions of senior citizens on fixed incomes who cannot afford the additional costs of natural gas and electricity, and they vote. In the same way that Wal-Mart increases revenues by lowering the price and selling more, politicians have increased their political capital by discounting the war in Iraq, terrorism, and health care in favor of energy. Some of these issues are still significant, especially the war in Iraq. The policy of "wagging the dog" by focusing on energy issues might not succeed.

The oil industry is not perfect, and oil professionals are not saints. But using fear to create industries that depend heavily on government to subsidize farmers, producers, and consumers should remind us of the policies of a certain Evil Empire that fell like a house of cards in the late 1980s. The politics of fear can easily destroy three great pillars of civilization: democracy, liberty, and human rights. What we should fear is not fear itself, but the politics of fear. ✦

COMMENT

The author

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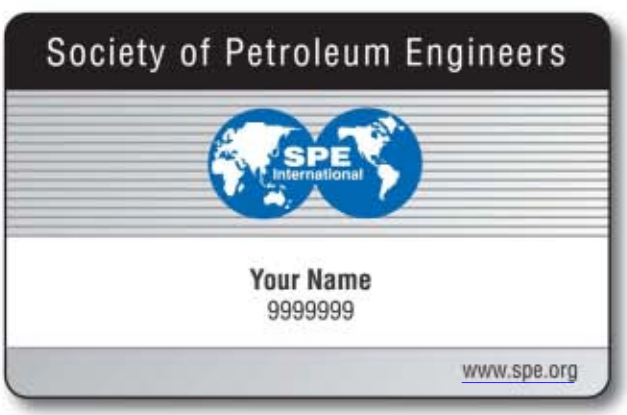

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White House outlines veto bait in energy package

Nick Snow
Washington Editor

The White House has notified US House Speaker Nancy Pelosi (D-Calif.) that President George W. Bush would veto any energy bill that reduced instead of increased domestic production, raised taxes or used the tax code to single out specific industries, or imposed price controls that would bring back long gasoline lines reminiscent of the 1970s.

Advisors also would recommend that a bill be vetoed if it contained elements such as the so-called "NOPEC" provision, which encouraged retaliation against US businesses abroad, discouraged foreign investments in the US economy, and injured US relations with other countries, said Alan B. Hubbard, assistant to the president for economic policy and director of the National Economic Council, in an Oct. 15 letter to Pelosi.

Hubbard's letter came as oil and gas industry association officials and others responded to Pelosi's Oct. 11 announcement that she would use less-formal meetings between House and Senate Democrats to produce compromise energy legislation if a formal conference including Republicans did not appear possible.

"Every indication we see is that the Democratic leaders in the House and Senate plan to get together and try to cobble together an energy plan. We're concerned that several members with oil and gas experience may be left out," Mark Kibbee, a senior policy analyst at the American Petroleum Institute, said on Oct. 16.

He told OGJ that API and its members remain concerned about provisions in energy bills that passed the House and Senate earlier this year. Both contain language aimed at stopping alleged gasoline price gouging, for example. API has said that such provisions actually are indirect efforts to reintroduce price controls.

Punitive provisions

Kibbee said that other provisions would roll back incentives included in the Energy Policy Act of 2005 to assist the global competitiveness of US producers. "Some of the tax offsets were very punitive and would deter more domestic production," he observed.

"We won't be energy independent anytime soon. But taking away incen-

tives doesn't square with trying to improve energy security," Kibbee said.

The Institute for Energy Research said on Oct. 16 that Pelosi, by refusing to review the bills in a bipartisan conference committee, is trying to avoid public scrutiny of legislation that will raise consumer energy prices and put domestic producers at a disadvantage.

IER economist Robert Murphy said past government attempts to regulate oil and gas prices failed. The US could expect more of the same if new energy legislation isn't openly debated, he warned.

Ben Lieberman, senior policy analyst with the Heritage Foundation, characterized the bills that passed the House and Senate as "raising taxes on energies that work to subsidize energy sources that don't work."

Margo Thorning, senior vice-president and chief economist at the American Council of Capital Formation, said an ACCF study found that "if price controls like those being considered in legislative proposals earlier this year had been in effect during Hurricanes Katrina and Rita in 2005, losses to households and businesses would have totaled $1.9 billion."

In Dallas, the leader of the Texas Alliance of Energy Producers said on Oct. 12 that Pelosi was trying to go around standard legislative procedures in an effort to pass energy legislation which does not have the necessary support.

"She is attempting to circumvent long-standing legislative procedures.... The leadership of both parties should be allowed to appoint their members to the conference committee and work out the differences between the energy bills passed by the House and the Senate," said TAEP Chairman Frank King. ✦

IPAA: House energy bill would hurt small producers

Nick Snow
Washington Editor

Small building and contracting businesses potentially would benefit from energy efficiency provisions in legislation that the US House passed earlier this year, three witnesses told the Small Business Committee on Oct. 17. But a fourth warned that other provisions in

WATCHING GOVERNMENT

Nick Snow, Washington Editor

On economies and oil prices

Does an $80/bbl oil price pose a threat the economy? Not necessarily, according to the president of the Federal Reserve Bank of Dallas.

"Oil prices have been on a steady climb in recent years, tripling since early 2003 and breaching $80/bbl last month. This worries many people who remember the energy crises of the 1970s and the ensuing recessions. In fact, nine of the 10 post-World War II recessions were preceded by sharply rising oil prices," Richard W. Fischer told the Charlotte (NC) Economics Club. "I will remind you, however, we have had several episodes of sharply rising oil prices in the past 15 years without recessions."

In what Fischer called personal observations and not official policy, he differentiated short-term oil price swings from long-term supply and demand fundamentals. Instead of ignoring energy prices because they are dropped from the core inflation index, he picks them apart to understand their recent climb. His first question is whether a price run-up resulted from reduced supply or increased demand.

Different responses

"If it is reduced supply, like most of the oil price shocks prior to the mid-1990s, slowing economic activity and higher overall prices are likely. If the oil price increase is the result of a demand shock arising from productivity gains, however, we could see expanding economic activity and reduced inflationary pressures," Fischer said.

The US economy has recently responded to rising oil prices with continued growth in the gross domestic product, declines in unemployment, and relatively moderate price pressures, he continued. Consumer spending and consumer confidence have remained strong, while business investments have expanded. Economic growth overseas has not been derailed, which has kept demand for US exports healthy.

Economic research has suggested that factors including a lower energy-to-GDP ratio, experience with oil price shocks, and trading of energy derivatives, which reduce the need for physical inventories, may explain recent economic resilience, Fischer said. But he suspects there may be another reason.

Stronger demand

"For a few years now, some economists have suggested that the US economy ought to respond differently to rising oil prices if the increase is the result of stronger demand for oil needed to fuel an expanding US economy rather than a result of diminished supplies," he said.

A productivity shock originating in the US will boost domestic output and pull up the price of oil. Monetary policy that holds the nominal growth of GDP constant will reduce inflationary pressures. Economic expansion in India, China, or elsewhere will increase that country's oil demand but also can raise its productivity, affecting the US as lower prices for imported goods and technological gains.

"As long as this continues, we can expect to see an expansion of output and lower overall prices, even as the world price of oil rises. A vicious cycle is, in a sense, almost transformed into a virtuous cycle," Fischer said. ✦

HR 3221 would seriously harm other small businesses, namely marginal oil and gas well operators.

"The overwhelming number of wells in the United States falls into this [marginal] category," said Lee O. Fuller, vice-president, government relations, for Independent Petroleum Association of America. Fuller said about 85% of the nation's oil wells and 70% of its natural gas wells are classified as marginal. "Equally significant, while each marginal well is a small producer, collectively they provide about 19% of America's oil production and 10% of its natural gas production," he said.

Most of IPAA's members are independent producers with fewer than 20 employees, he told the committee. Like larger upstream companies, they would like more access to federally controlled resources, tax policies which allow producers to retain their cash flow and reinvest it, reasonable environmental regulations and more federal support of universities' programs to develop new exploration and production technologies and train geologists and petroleum engineers, Fuller said.

"Not only does HR 3221 fail to advance the need to develop more oil and natural gas, it reverses progress that has already been made. No bill can be considered a down payment on global climate policy that has, as one of its key objectives, curtailing the development of natural gas," he said.

The bill contains nine sections dealing with drilling permit applications, surface owner rights, onshore oil and gas reclamation and bonding, water resource protection, and other issues, which would reduce US oil and gas production, according to Fuller.

"The effect on small businesses would be twofold. For those small business oil and gas producers, investment dollars would be taken away. For small business consumers, the availability of American oil and gas would be diminished," he said. ✦

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Lawmakers seek data on Hunt Oil's Iraq oil contract

Nick Snow
Washington Editor

The chairmen of a US House committee and one of its subcommittees are seeking more information about a recent oil exploration contract that Hunt Oil Co. signed with the Kurdistan regional government in Iraq.

"By signing a contract with a regional government, Hunt Oil may have undermined US national policy of working toward passage of an oil revenue-sharing plan, which the Bush administration has called a critical step towards national political reconciliation in Iraq and the return home of US troops," said Rep. Henry A. Waxman (D-Calif.), chairman of the Oversight and Government Reform Committee, and Dennis J. Kucinich (D-Ohio), chairman of the committee's Domestic Policy Subcommittee.

A Hunt Oil executive said the company received a letter from the committee and would cooperate. "As stated before, our policy as a company has always been to act independently where to explore for oil and gas around the world. Our decision to enter into an exploration agreement with the Kurdistan regional government is totally consistent with that policy and was not based on any information other than what was in the public domain," said Jeanne Phillips, senior vice-president, corporate affairs and government relations, from the independent producer's Dallas headquarters.

Concerns particularly have been raised about the possibility that Hunt Oil chief executive Ray L. Hunt may have used nonpublic information learned as a member of President George W. Bush's Foreign Intelligence Advisory Board to further Hunt Oil's interests, Waxman and Kucinich said in Oct. 15 letters to Hunt and to Ryan Crocker, US ambassador to Iraq.

They asked Hunt to provide copies of any information he might have received in that capacity, or that any Hunt Oil employee, official or agency might have received about Iraq, Kurdistan, the Iraqi national hydrocarbon law, and US diplomatic efforts toward Iraqi national reconciliation, as well as any information regarding negotiations, contracts, or other interactions with the Kurdistan regional government.

Waxman and Kucinich asked Crocker to provide e-mails and other communications regarding negotiations, contracts, or other interactions between Hunt Oil and the Kurdistan regional government, between any official or employee of the US Embassy in Iraq, and any official of the US, Iraqi, or Kurdistan regional government.

They asked that the information be sent to the committee by Nov. 2 to help it determine if the matter should be investigated. ✦

Oil & Gas UK launches UKCS decommissioning options

Uchenna Izundu
International Editor

Trade association Oil & Gas UK (OGUK) has launched a new framework agreement to help operators clarify decommissioning liabilities for infrastructure on the UK continental shelf.

The Decommissioning Cost Provision Deed (DCPD) provides different options for joint venture partners to consider in setting up a decommissioning plan for offshore assets. DCPD would help reduce uncertainty over decommissioning responsibilities, as current provisions under UK law allow the government to call back previous licensees to pay decommissioning costs even if they have sold their interests to another party, said OGUK Operations Director Paul Dymond in London Oct. 16.

"These issues are hindering asset trading," Dymond said, adding that this could jeopardize maximum economic recovery from the UK North Sea. In reviewing joint operating agreements that companies are using to establish liabilities, OGUK found that many were inadequate because there were no explicit provisions to cover decommissioning.

The government is committed to review on a case-by-case basis DCPDs that buyers approve, and if it is satisfied, it will release sellers from being held responsible for decommissioning liabilities under Section 29 of the Petroleum Act 1998. In a recent decommissioning consultation with industry, the government declined to change Section 29, preferring to monitor the effectiveness of DCPDs and develop a transparent way to assess whether buyers can cover their decommissioning costs.

These costs are expected to fall between £15-20 billion, with uncertainties regarding technology, product costs, and timing possibly increasing estimates. Major projects have been delayed as high oil prices have improved the economic attractiveness of continuing production.

Improved technologies will help to decrease costs, but Dymond warned that technology companies are reluctant to invest because market signals are poor. "It would be good to see floating devices to work alongside lifting vessels as new technologies," Dymond said. "We have set up a working group... to better plan for the future to help develop technologies and capabilities," Dyson said.

Dymond told OGJ the success of

DCPDs will be rated by the number of operators using them. However, OGUK will not use targets, because it is a trade association and cannot compel companies to implement them. Out of the 400-500 fields on the UKCS, fewer than 100 have securities in place to cover decommissioning plans.

Dymond told reporters the association was also talking to government about changing the tax treatment of decommissioning costs. Presently companies acquire letters of credit from banks to show they are capable of handling the liabilities. "This form of financial security is problematic," Dymond said, pointing out that small companies find it difficult to secure the letters, especially if they have only the one asset.

"Oil and Gas UK are suggesting a sinking fund that companies could put funds into, but this would need to have a tax relief put up against it to make it work," he said. OGUK also is anxious to have the threat of inheritance tax removed from trust funds set up for decommissioning. ✦

Cooper basin find indicates two prior strikes linked

Rick Wilkinson
OGJ Correspondent

Innamincka Petroleum Ltd., Brisbane, has made an oil discovery with its Flax East-1 well in the Cooper basin of South Australia. The company says the find confirms that two previous discoveries at Flax and Juniper fields are connected and could boost total oil in place to 120 million bbl.

Innamincka explains that the successful Flax East-1 was drilled in the structural saddle between the two highs. Wireline log data from the well indicate that the Permian Patchawarra formation and Tirrawarra sandstone targets are oil-saturated with no evidence of water saturation in the reservoirs.

Innamincka says the find has lowered the known base oil level by about 24 m, and there is a reasonable basis for concluding that Flax-Juniper field will prove to be one of the largest onshore oil fields in Australia.

The company has drilled eight wells in the field area, located in Permit PEL 103 about 50 km northeast of Moomba on the South Australia-Queensland border. All of them have encountered oil-saturated sands in the primary target interval with an average net pay thickness for the basal Patchawarra-Tirrawarra of about 7 m.

The Flax East-1 has a net pay of 10.2 m in the primary zone, and the sands in question were better developed than in most of the other wells in the region. The well has been cased and suspended for future production.

Meanwhile, Flax field itself is under development, with well completion and fracture stimulation beginning in early August this year. All four wells at Flax have required fracture stimulation, and the postfrac clean-up flows have varied considerably.

Flax-1 is expected to have a flow rate capability of 300-350 b/d of oil. It flowed 600 b/d on test when found in January 2004.

Flax-2 has an initial postfrac flowback of 200 b/d of fluids (150 b/d of oil and 50 b/d of frac fluid).

Flax-3 has a postfrac clean-up flow of 700 b/d of fluid (580 b/d of oil and 120 b/d of frac fluid), while Flax-4 is flowing postfrac at 200 b/d of fluids (160 b/d of oil and 40 b/d of frac fluids).

Production is also constrained by the limited field infrastructure. Innamincka says temporary flowlines to be installed this month should lead to consistent production.

A gas compressor expected at the field late in October will be used to reinject produced gas into the reservoir via Flax-1. The company hopes to have a production of 1,000 b/d of oil from the initial wells by the middle of next year.

The crude is 52° gravity. Solution gas in the reservoir has been measured at 2.5 Mcf/bbl of oil.

Innamincka expects that the two wells drilled on the Juniper structure plus the just-completed Flax East-1 will also prove to be commercially viable.

The total reserves estimate following the Flax East-1 result will be assessed in an independent report likely to be completed by January 2008.

The need of the Permian reservoirs for fraccing will limit the recovery factor, which according to some initial estimates might be as low as 15%.

A recent decision by Santos to build an oil pipeline from Jackson field in Queensland to Moomba in South Australia will provide Innamincka with the option of laying a connecting line from the Flax-Juniper fields.

Innamincka holds 75% interest in PEL 103 Block. Seoul City Gas, South Korea, holds the remaining 25%. ✦

Australia approves Pluto, Gorgon LNG projects

Rick Wilkinson
OGJ Correspondent

Two LNG projects in Western Australia have passed through certain approval stages, moving them closer to reaching completion.

The Australian government has granted environmental approval for Woodside Petroleum Ltd.'s Pluto LNG gas development in Western Australia. Separately, Australia's Federal Environment Minister Malcolm Turnbull has given the official green light to the Chevron group's Gorgon LNG project

WATCHING THE WORLD

Eric Watkins, Senior Correspondent

Putin resists Caspian lines

Western leaders, mistrustful of the intentions of Russia as a supplier of energy, want to ensure that other sources of oil and gas are available. Much of that supply is being sought in countries of the former Soviet Union, and that makes the Russians nervous.

A sign of nervousness came last week when Russian leader Vladimir Putin met Iranian President Mahmoud Ahmadinejad and warned the West not to pursue oil pipeline projects in, around, and under the Caspian Sea that are not backed by regional powers.

In fact, Putin warned that energy pipeline projects crossing the Caspian could be implemented only if all five nations that border the Caspian support them. He even played the now famous—or infamous—environmental card.

"Projects that may inflict serious environmental damage to the region cannot be implemented without prior discussion by all five Caspian nations," said the Russian leader, whose warnings underlined Moscow's strong opposition to efforts toward pipelines to the West bypassing Russia.

New pipeline

Putin's warnings came just days after ministers from five East European countries signed an agreement for construction of an oil pipeline extension that will bypass Russia and link Caspian producers directly to consumers in Europe.

The agreement, signed by Azerbaijan, Georgia, Ukraine, Poland, and Lithuania, calls for the building of a 490-km extension to the existing Odessa-Brody pipeline and securing supplies of Azerbaijan's oil to fill the extended line.

The new pipeline is considered a victory for Europe generally and East European governments in particular, who are increasingly weary of Russia's nationalistic energy policy and are searching for alternative energy sources and supply routes. It is no less a victory for Caspian producers who want to reach markets free of Russian middlemen.

Other Caspian producers are interested in similar pipeline projects, including Turkmenistan, which last month conferred with Austria's Economic Minister Martin Bartenstein, the UK's Minister of State for Energy Malcolm Wicks, and, to Putin's chagrin, US Secretary of State Condoleeza Rice.

Turkmenistan interested

Along the way, Turkmen President Gurbanguli Berdymukhamedov said his country, "having multiple vectors in its energy policy and creating alternative export routes, including in the southern direction through the Caspian Sea, is prepared to deliver natural gas to European countries."

But Putin is fully prepared to oppose any such effort, as evidenced by his visit to Tehran. Indeed, he seems to be envisioning an earlier time when Iran and the former Soviet Union controlled all of the resources of the region—as well as access to them.

By realigning with Iran—now under Western eyes for its nuclear ambitions—Putin is attempting to apply pressure that he hopes will cause producers and consumers to have second thoughts about pipelines from the Caspian.

It is a power play, pure and simple, but one doomed to fail. Market forces are stronger by far than Putin's rhetoric or his nerves. ✦

proposed for Barrow Island, also off Western Australia.

Pluto project

The approval for the Pluto project comes with strict environmental conditions, including the reduction of any impacts on threatened species, such as the Olive Python, sea turtles, and other marine mammals.

Woodside also will be required to establish management plans to protect the marine environment, including a dredging and spoil management plan prior to pipeline work, an oil spill contingency plan, and plans for offshore drilling operations, construction, installation, and operations management.

The $11.2 billion (Aus.) Pluto development includes installation of a production platform in 85 m of water at the offshore field about 190 km northwest of Karratha, a 180 km, 36-in. subsea gas pipeline to shore, and construction of a 4.3 million tonne/year LNG liquefaction plant, storage, and wharf facilities at two separate sites on the Burrup Peninsula.

The government said the Pluto development will inject $17.6 billion (Aus.) into the national economy. About 28% of the 3,000-person workforce will live locally. There will be an additional 3,200 jobs during later operations.

Gas reserves are estimated to be 5 tcf, including nearby Xena field, which will be added in later development.

Currently Woodside holds 100% interest, but the project is underpinned by a package of LNG sales agreements and equity with Tokyo Gas and Kansai Electric of Japan, each of which will take 5% equity in Pluto.

The field was found in 2005. Initial onshore site works began earlier this year, and first LNG production is expected in 2010.

Gorgon project

Approval of the two-train, 10-million-tonne/year Gorgon LNG development project is subject to strict environmental protection measures, which include:

• Development and implementation of a quarantine management plan, overseen by an expert advisory panel, to protect threatened species on Barrow Island.

• Development and implementation of a protection regime for the Flatback Turtle.

• Environmental management plans for operation of the gas field and processing plant.

• Annual environmental performance reports for the Federal Department of the Environment and Water Resources.

Chevron also will implement 36 environmental protection measures imposed by Western Australia, which gave its approval last month. Those measures include a $60 million (Aus.) commitment to conserve the Flatback Turtle and other endangered species and the mandatory inclusion of carbon sequestration facilities.

Sequestration plans are already under way for reinjecting about 3 million tonnes/year of carbon dioxide into a reservoir formation deep below Barrow Island.

Project operator Chevron said it will incorporate all the detailed environmental conditions into its work plan.

Originally budgeted at $11 billion (Aus.), the project likely will cost more than $15 billion (Aus.). Sequestration costs for the first decade alone are expected to be $850 million. Australia will provide $60 million from its low-emissions technology fund towards the geosequestration plan.

Australia expects Gorgon to contribute $20 billion (Aus.) to the country's economy and generate about 6,000 jobs over the project's life.

There is continued speculation that the Gorgon project at some point will move to double its currently approved design capacity of 10 million tonnes/year of LNG output, which would make it substantially larger than the existing North West Shelf gas project.

Gorgon has about 60 tcf of gas in proved, probable, and possible gas reserves to call on in the surrounding area.

Despite the environmental caveats imposed on the current project, Greg Bourne, head of the conservation group WWF-Australia, expressed disappointment at the decision to locate Gorgon facilities on Barrow Island rather than on the mainland.

Although Chevron has a 40-year track record managing the island's environment during development and production from Barrow Island oil field, Bourne says there are no conditions that would ever make Barrow—one of Australia's oldest and most important Class A nature reserves—an acceptable location for an LNG plant.

Gorgon project participants are Chevron 50% and ExxonMobil and Shell, 25% each. ✦

Turkmen leader eyes changes in energy administration

Eric Watkins
Senior Correspondent

Turkmenistan President Gurbanguly Berdimuhammedov, following his recent public criticism of the country's oil and gas output, is said to be planning changes in the industry's administration. All key officials in the industry are under scrutiny.

"The results achieved do not match the real potential of the country's oil and gas industry, the growth rates needed for the Turkmen economy at a new stage of its history, and for the tasks outlined," the president said Oct. 15 during a televised meeting with the country's oil and gas leaders.

"The performance in the fuel and energy sector does not match the huge amounts of money allocated. This is why the performance of the fuel and energy sector in general should be rated as unsatisfactory," the president said.

"Because of our enormous natural and industrial potential, the fuel and energy sector plays a leading role in the national economy," the president said, adding that the main tasks set before this critical industry were reflected in the Turkmenistan oil and gas industry development program until 2030.

After hearing reports from the country's oil and gas executives, the president criticized their poor results on a number of issues. "The situation on the global market is not being taken into account. There is little use of new technologies and innovative scientific developments," he said.

"The oil and gas sector needs radical reforms," said the Turkmen leader.

Reports say Berdimuhammedov is eyeing the removal of the director of the state agency for the usage of carbohydrate resources, Bairammurad Muradov; Turkmengas Chairman Yagshgeldu Kakayev; Turkmenneft Chairman Kariagdy Tashliyev; Minister for Oil and Gas Industry of Mineral Resources Baimurat Khodzhamuhammedov; Turkmenneftegazstroi Chairman Dzumagedlu Babashev; Turkmengiologiia Chairman Sapageldu Dzumayev; and the heads of state petrochemical factories, Tukrmenbashi's Tgandeldi Mammedov and Turkmenkhimia's Muratgeldi Kurayev.

In late September, the Turkmen leader met with US Sec. of State Condoleeza Rice and later encouraged international investment in his country's oil and gas industry as a means of boosting output (OGJ Online, Sept. 21, 2007). ✦

Oxy USA takes position in Central Utah thrust play

The Central Utah thrust belt oil and gas play may have a new exploration proponent with deep pockets.

Wolverine Gas & Oil Corp., Grand Rapids, Mich., and its numerous partners in the 2004 Covenant oil and gas field discovery in central Utah have assigned major interests in the hingeline area to Oxy USA Inc., Houston, an affiliate of Occidental Petroleum Corp., Los Angeles.

A 700-page document filed at Richfield in Sevier County, Utah, indicates that Wolverine and more than two dozen partners assigned to Oxy USA various working interests in Covenant field, four exploration prospects, the Wolverine Unit Area in Sanpete and Sevier counties, and land known as the Arapien Basin Area of Interest.

The document states that Oxy USA, under an agreement dated July 26, 2007, acquired from each assignor working interests in Covenant field, interests in any unit or pooled area in which the leases are included, all oil, gas, condensate, and injection wells, lease equipment, and pipelines.

It was understood that the interests Oxy acquired lie in seven counties in the play. The acquisition also included most technical data. Consideration was not disclosed.

Wolverine and two privately held partners also retained an overriding royalty interest in each lease.

It is also understood that production casing has been set to roughly 11,000 ft, probably in a zone not previously penetrated in Covenant field, at a well in NE SW 17-23s-1w, Sevier County, on the crest of the Covenant anticline.

State figures show that Covenant field produced 884,600 bbl of oil in 2005 and more than 2 million bbl in 2006, when it was the state's third largest oil-producing field (OGJ, Jan. 17, 2005, p. 42).

Wolverine in 2005 predicted that the thrust belt will become a billion-barrel oil province, but no follow-up discovery has been announced thus far.

Some 150 miles north of Covenant field, Oxy drilled a well east of Coalville, Utah, in 1971-72 and found oil shows in Jurassic Nugget before American Quasar Petroleum Co. took a farmout from Oxy and drilled the Pineview field oil discovery well 1 mile east in 1975 to open production on the Overthrust Belt. ✦

Rig drills a deep test projected to Permian Kaibab on the Hingeline south of Sigurd in Sevier County, Utah, across the highway from the main producing station that contains the Covenant field discovery well and five development wells producing oil from Jurassic Navajo sandstone. Photo courtesy of Michael L. Pinnell, Chief Oil & Gas LLC, Dallas.

Austin independent eyes Paradox, Hingeline work

Royalite Petroleum Co. Inc., an Austin independent that owns 100% working interest in more than 67,000 acres in Central Utah's Hingeline trend, also hopes to explore near recent gas-condensate discoveries in the northwestern Paradox basin.

Royalite signed a letter of intent with Twilight Resources LLC and affiliates to acquire a 50% interest in 6,216 acres east of Delta Petroleum Corp.'s Greentown State 36-11 discovery well in Grand County. Consideration is $6.22 million.

Royalite, which becomes operator if it completes the purchase by Dec. 1, 2007, said as many as 77 wells could be drilled on the 6,216 acres. Royalite would carry Twilight through the completion or plugging of two wells drilled to the top of Mississippian or 11,000 ft, whichever is less.

The proposed purchase is also subject to Royalite closing the previously announced acquisition with Central Utah Lease Acquisition LP by Nov. 19, 2007. That deal, for which Royalite is attempting to raise funds, involves the purchase of interests in 108,000 acres in Juab and Sanpete counties north of Covenant field.

The Central Utah deal if completed would involve drilling two wells to the top of Jurassic Navajo sandstone or 12,000 ft, whichever is less. Royalite said the acreage contains Keystone, a prospect in Sanpete County near the axis of the 55-mile Wasatch monocline. Keystone, which contains several four-way closed structures and-or combination fault trap structures, was defined by surface geology, 200 line-miles of reprocessed 2D seismic, gravity, and aeromagnetic data, and 1,200 surface soil geochemical samples.

Primary objectives are Jurassic Twin Creek limestone and Navajo, and secondary objectives are Cretaceous Ferron and Dakota sandstones.

Paradox clastics

Delta said it hopes to ultimately recover 2-4 tcf of gas net to its 70% interest from Pennsylvanian Hermosa Group clastics in Grand County south of Green River, Utah, where it drilled the Greentown State 36-11 and 32-42 wells (OGJ Online, Mar. 2, 2007).

Royalite notes that Delta completed the 36-11 well in two of 16 similar clastic pay intervals and estimated proved reserves in the two perforated zones at 2.7 bcfe in this well. If the untested intervals have similar log characteristics, as Delta reported, estimated proved reserves at the well could exceed 10 bcfe, Royalite said.

The two completed sections had initial 8,000 psi wellhead pressures

before the well blew out during tests, Royalite said. Logs from nearby wells also contain similar siltstone, sandstone, and shale intervals and appear to have 800-1,100 net ft of clastic pay intervals interspersed in the 4,000-ft-thick Paradox formation.

The 32-42 well 7½ miles southeast of the 36-11, tested at a combined 2 MMcfd of gas and 500 b/d of condensate from 8 of 16 clastic pay sections identified, and Delta estimated 5.8 bcfe of proved reserves in the eight intervals.

Logs from other area wells show stratigraphic clastics sections with reservoir quality sands not found to the southeast in the basin, Royalite said.

These newly discovered areas in the Paradox and Hingeline are "the best onshore oil and gas plays in the US," said Michael L. Cass, president and chief executive officer of Royalite. ✦

ONGC to revise marginal field development deals

Shirish Nadkarni
OGJ Correspondent

India's Petroleum Ministry has asked state-owned Oil & Natural Gas Corp. to review its existing mechanism for developing marginal fields, in order to ensure more attractive fiscal packages to attract service contractors.

Although substantial volumes of hydrocarbons are locked up in marginal fields, they cannot be produced economically on a stand-alone basis or with conventional approaches, so the best way to exploit their full potential is by outsourcing them to smaller companies.

ONGC employs a bidding process to enter into service contracts with companies having the necessary expertise to develop the marginal fields. However ONGC finds it difficult to attract bidders, as the fiscal package it offers service contractors is not sufficiently attractive.

"Keeping in mind the element of government subsidy, the company has to also provide for cess (surcharge) and royalty from these fields," a market source said.

In addition, "There is also a cap of $35/bbl on the pricing of crude oil drawn from these fields...whatever the ruling international crude prices," the source said. This makes the offer unattractive to prospective bidders, "as all development cost has to be borne by the contractor."

The Petroleum Ministry also has asked the Directorate General of Hydrocarbons, who monitors blocks awarded under the New Exploration Licensing Policy rounds, to devise a formula for the exploration major that would yield

better results from the fields.

Marginal fields, having low oil and gas reserves, are economically viable when produced with low capital cost and overhead. With the changing world oil price scenario, innovative technologies, and liberal government regulations, the development of marginal fields has assumed importance for increasing production and profit.

ONGC produced 490,000 tonnes of oil and 22.6 million standard cu m of gas from marginal fields under its control in fiscal 2006-07.

The company holds 165 marginal fields, of which 79 are offshore and 86 onshore. Of the 165 fields, 63 have already been financed, 71 are being funded, and funding for 31 is pending.

ONGC has initiated action to put about 96% of marginal field reserves on production during its eleventh 5-year plan (2007-12). ✦

Papua New Guinea

Austral Pacific Energy Ltd., Wellington, NZ, will appraise the remote Stanley gas-condensate discovery in far western Papua New Guinea.

The 1999 discovery well, 170 km west-northwest of the Moran fields and 30 km east of the border with Indonesia's Papua Province, went to TD 10,600 ft and encountered the Cretaceous Toro formation at 10,300 ft. The untested well cut 35 m of excellent quality Toro reservoir with 13.5 m of gross gas pay interpreted from wireline logs.

Austral Pacific operates PRL 4 with 28.92% interest. InterOil Corp. has 43.13%, and Horizon Oil Ltd. has 27.95%. The government extended the license 5 years from August 2005.

Austral Pacific plans to shoot 43 km of 2D seismic late this year to address the field's structural uncertainty and locate an updip appraisal-development well. It is negotiating with the OK Tedi mine, which might buy gas to generate electricity.

Peru

Test rates at Corvina field on Block Z1 off northwestern Peru totaled 8,300 b/d of oil and 184 MMcfd of gas after seven drillstem tests were conducted at the third and most productive well, CX11-14D, said BPZ Energy Inc., Houston.

The company plans to dually complete the well and will spud the CX11-18XD well.

CX11-14D is productive mostly from the Lower Miocene Upper Zorritos formation, where six drillstem tests were run. Two were in the oil zone and four in the gas zone.

The 100 Mcfd gauged from the Middle Miocene Cardalitos formation was noncommercial in the offshore setting but encouraging enough "to keep evaluating its potential in our onshore blocks," the company said.

Prince Edward Island

Corridor Resources Inc., Halifax, NS, was to cement production casing to TD 3,403 m at the New Harmony-1 wildcat north of Souris on eastern Prince Edward Island.

The well had gas shows in Carboniferous Bradelle sandstone at 3,790-3,403 m, said PetroWorth Resources Inc., Calgary.

Corridor believes that frac stimulation is needed due to low porosities, and a decision won't be made until it has evaluated all the log and sidewall core information.

Arizona

Vanterra Energy, Denver, plans to drill a Basin and Range Province wildcat in northwestern Arizona in 2008.

PetroSun Inc., Scottsdale, Ariz., said it signed a drilling commitment with Vanterra on a 12,783-acre lease in Mohave County where Vanterra developed the prosect. The well is to be drilled to basement or at least 6,000 ft to evaluate all zones of interest.

The agreement grants PetroSun a 25% carried working interest through casing point. The lease provides an 81.25% net revenue interest to the working interest owners.

Most of PetroSun's Arizona holdings are in the Holbrook basin.

Kentucky

Meridian Resource Corp., Houston, has drilled two wells to evaluate gas potential in Devonian New Albany shale northwest of Corydon in Henderson County, Ky., in the southern Illinois basin.

The company, operator with 92% working interest, plans to run a full log suite and gather core samples for thorough geochemical analysis from the Farms of Meadow Hills-1 well, drilled to TD 4,600 ft. A second well, Keach-1, is drilling at 3,900 ft.

The company owns 30,000 acres in the general area, where other active operators include El Paso Corp., Chesapeake Energy Corp., EOG Resources Inc., Forest Oil Corp., Quicksilver Resources Inc., and American Oil & Gas Inc.

Washington

Exxel Energy Corp., Houston, became operator of the Brown 7-24 wildcat, TD 12,668 ft, and with the other working interest owners will analyze well data to determine future completion activities.

The well, drilled by EnCana Oil & Gas (USA) Inc., is in Grant County in the Columbia River basin, where Exxel has interests in 415,000 net acres (see map, OGJ, Sept. 3, 2007, p. 31).

Exxel said it plans to apply for permits to drill its top three prospects in the fourth quarter of 2007 and remains committed to evaluate its best prospects in 6-10 months.

Larger, newer rig fleet enables 7% increase in world drilling

Oil prices remain strong, surpassing $80/bbl this year, keeping operators motivated and contract drillers busy despite depressed natural gas prices. Worldwide use of drilling rigs continued to increase 7% over levels 1 year ago, particularly for land drilling in the US, Latin America, and Asia-Pacific, and offshore Middle East.

Higher oil prices and sweeping nationalism, however, have prompted some countries to seize industry operations or force contract renegotiations, halting some planned drilling. Higher prices also drive diversification, research, and development of alternative energy resources, as well as renewed efforts at conservation and efficiency.

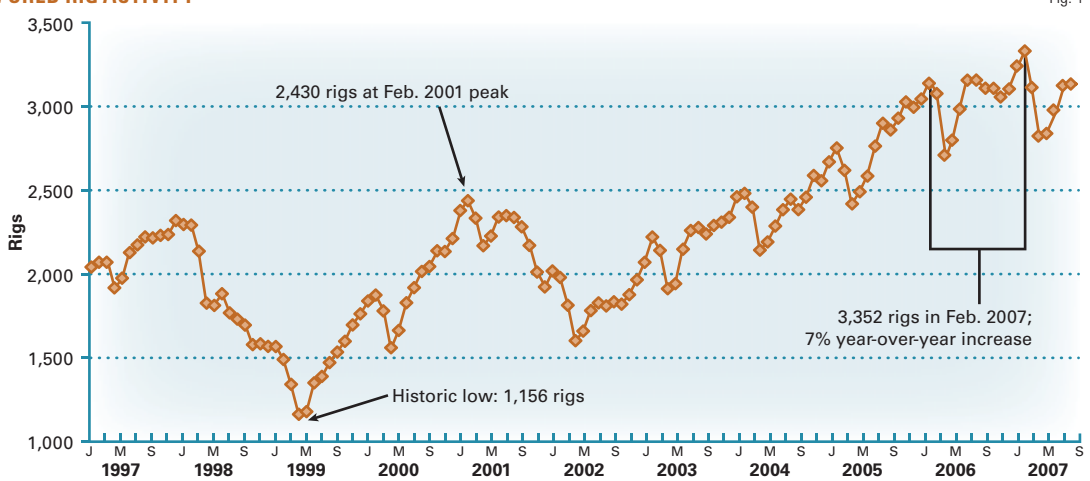
Analysts have been watching and waiting as hundreds of newbuild land rigs, dozens of jack ups, and a handful of semisubmersibles have entered the market. There is lower utilization of land rigs than marine rigs, and continuing tightness in the offshore rig market, particularly for floaters.

Speculators continue to push newbuild programs for mobile

Nina M. Rach
Drilling Editor

WORLD RIG ACTIVITY

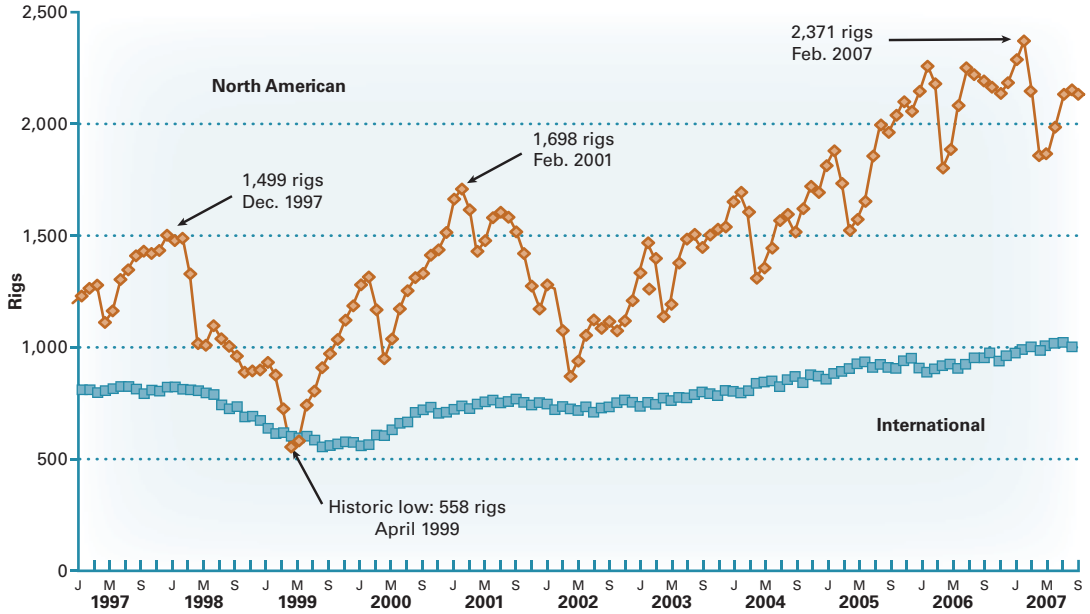
Fig. 1



Source: Baker Hughes Inc.

NORTH AMERICAN, INTERNATIONAL RIG COUNTS

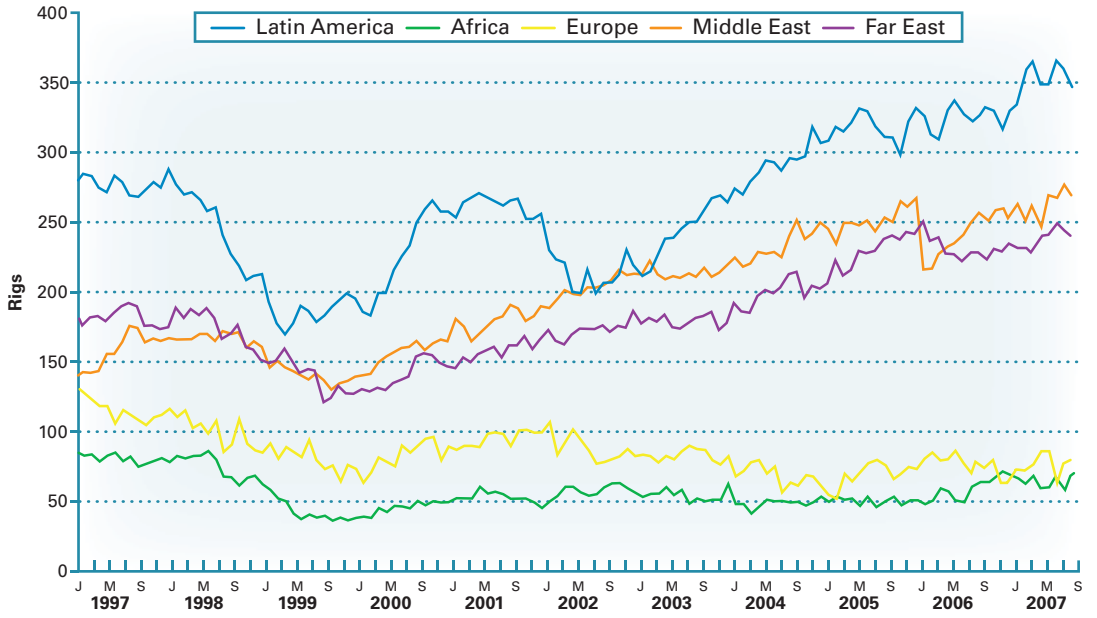
Fig. 2



Source: Baker Hughes Inc.

INTERNATIONAL RIG COUNT BY REGION

Fig. 3



Source: Baker Hughes Inc.

Worldwide activity

Worldwide drilling set a record in February 2007, with 3,352 rigs operating. Then the rig count plummeted 15% to 2,835 rigs in April. Drilling picked up almost immediately and returned to levels equal to a year ago (Fig. 1).

Why did the worldwide rig count quickly plunge by 517 rigs in the first half of the year? Gas prices were depressed, reducing gas drilling, and spring breakup in Canada was extended.

Baker Hughes Inc.'s international rig count (excluding North America, Iran, and Sudan) reached a record high of 1,018 rigs in July 2007, up 10.5% from 921 rigs a year earlier (Fig. 2).

The overall rise in rig use derives mainly from increases in US, Latin America, Middle East, and Asia-Pacific regions, with rig use in Africa and Europe relatively flat over the past year (Fig. 3).

The greatest increase in rig numbers during this calendar year has been in Latin America, where 348 rigs were operating in August, up from 335 rigs in January (4% increase in 8 months).

offshore drilling units (MODUs), with at least 150 units currently under construction (OGJ, Sept. 24, 2007, p. 41).

Two of the largest offshore drilling contractors, GlobalSantaFe Corp. and Transocean Inc., announced a merger in July. The combined company will own 147 rigs, including 72 floaters and 68 jackups, and will control 27% of the world's 551 jack ups, semisubs, and drillships.

TOP 50 US OPERATORS IN 2007

Table 1

Rank[1]	Company	Well starts[2]	Wells, %	Footage drilled	Footage, %	Average footage	Wells with PTD[3]	Dir. wells
1	Chesapeake Operating Inc.	1,126	4.4	10,904,210	5.6	9,745	1,119	53
2	EOG Resources Inc.	801	3.1	6,778,713	3.5	8,635	785	40
3	XTO Energy Inc.	683	2.7	7,475,475	3.8	10,945	683	14
4	Aera Energy LLC	674	2.6	43,110	—	6,159	7	0
5	Devon Energy Production Co. LP	644	2.5	5,955,172	3.1	9,363	636	26
6	EnCana Oil & Gas (USA) Inc.	591	2.3	5,879,767	3.0	10,000	588	96
7	Dominion Oklahoma Texas E&P Inc.	491	1.9	4,288,759	2.2	8,753	490	1
8	Chevron USA Inc.	398	1.6	1,700,232	0.9	8,459	201	15
9	Williams Production RMT Co.	373	1.5	3,027,623	1.6	8,205	369	155
10	Pioneer Natural Resources USA Inc.	357	1.4	3,727,174	1.9	10,499	355	2
11	Atlas America Inc.	356	1.4	1,822,824	0.9	5,268	346	0
12	Kerr-McGee Oil & Gas Onshore LP	304	1.2	2,512,471	1.3	8,546	294	51
13	BP America Production Co.	303	1.2	3,071,634	1.6	10,377	296	52
14	SEECO Inc.	302	1.2	1,407,803	0.7	4,693	300	14
15	ConocoPhillips Co.	288	1.1	2,539,452	1.3	8,942	284	18
16	Burlington Resources Oil & Gas Co. LP	285	1.1	2,665,681	1.4	9,947	268	39
17	Apache Corp.	281	1.1	2,284,382	1.2	9,680	236	12
18	Cabot Oil & Gas Production Corp.	237	0.9	1,831,049	0.9	7,927	231	1
19	El Paso Exploration & Production Co. LP	223	0.9	1,663,577	0.9	7,631	218	6
20	Chesapeake Appalachia LLC	212	0.8	751,103	0.4	4,877	154	0
21	Great Lakes Energy Partners LLC	199	0.8	1,068,974	0.5	5,454	196	1
22	Noble Energy Production Inc.	193	0.8	1,669,181	0.9	8,694	192	15
23	Energen Resources Corp.	189	0.7	877,809	0.5	4,745	185	4
24	Dominion Exploration & Production Inc.	186	0.7	1,211,030	0.6	6,804	178	16
25	United States Exploration Inc.	186	0.7	1,417,762	0.7	7,622	186	1
26	Samson Lone Star LLC	169	0.7	1,957,014	0.1	11,580	169	7
27	Quicksilver Resources Inc.	167	0.7	1,115,875	0.6	6,682	167	1
28	Anadarko E & P Co. LP	166	0.6	1,704,106	0.9	10,266	166	20
29	Range Production Co.	153	0.6	1,167,750	0.6	7,683	152	1
30	Occidental of Elk Hills Inc.	148	0.6	235,700	0.1	7,366	32	0
31	SandRidge Energy Inc.	148	0.6	1,493,100	0.8	10,089	148	0
32	Continental Resources Inc.	140	0.5	896,633	0.5	9,539	94	41
33	Houston Exploration Co., The	139	0.5	964,035	0.5	6,936	139	11
34	Newfield Exploration Mid-Continent Inc.	128	0.5	1,384,252	0.7	10,900	127	11
35	Newfield Production Co.	124	0.5	780,850	0.4	6,400	122	13
36	Whiting Oil & Gas Corp.	123	0.5	821,382	0.4	7,020	117	8
37	Plains Exploration & Production Co.	122	0.5	818,098	0.4	6,992	117	43
38	Questar Exploration & Production Co.	121	0.5	1,443,244	0.7	12,231	118	27
39	Petroleum Development Corp.	114	0.4	900,001	0.5	7,895	114	23
40	Endeavor Energy Resources LP	112	0.4	1,319,000	0.7	11,777	112	0
41	Comstock Oil & Gas LP	111	0.4	1,179,393	0.6	10,625	111	5
42	Denbury Onshore LLC	111	0.4	948,143	0.5	8,779	108	9
43	Forest Oil Corp.	109	0.4	1,253,049	0.6	11,602	108	3
44	Henry Petroleum LP	109	0.4	1,177,700	0.6	10,805	109	0
45	BP Exploration (Alaska) Inc.	106	0.4	676,544	0.3	7,959	85	17
46	OXY Permian Ltd.	101	0.4	613,200	0.3	6,071	101	16
47	Cimarex Energy Co.	100	0.4	1,132,190	0.6	11,322	100	6
48	Bill Barrett Corp.	98	0.4	762,842	0.4	7,784	98	23
49	Cimarex Energy Co. of Colorado	95	0.4	592,805	0.3	7,057	84	2
50	KCS Resources Inc.	95	0.4	913,411	0.5	9,822	93	3
	Total	**12,991**	**50.7**	**102,825,284**	**52**	**11,688**	**922**	

[1]Rank according to number of wells drilled. [2]Wells deeper than 2,500 ft. [3]Wells that have a proposed total depth.
Source: RigData; data from Jan.1-Sept. 25, 2007

Argentina continues to drill with the largest fleet of land rigs in Latin America, although this year it dropped to 73 rigs in July from a high of 87 in May, according to Baker Hughes. Mexico was running 68 land rigs in August, Venezuela was drilling with 62, and Colombia with 41. Brazil used 18 land rigs in August, Ecuador 11, Peru 5, Bolivia 3, and Chile 2.

Brazil leads in offshore drilling, with 22 marine rigs, predominantly floaters, operating in August, followed by Mexico 19 (predominantly jack ups), Venezuela 16 (predominantly drilling barges), Trinidad 4, and Peru 2.

Europe led with the largest percent increase in rig use, with 82 rigs operating in August, up from 74 rigs in January (11% increase). Most land rigs were in Germany and Yugoslavia (5 each); Italy (3); Hungary, Poland, and Romania (2 each); and in other countries. The UK led offshore drilling in August, with 28 rigs operating, followed by Norway (20), Denmark and The Netherlands (3 each), and others.

A consortium led by Providence Resources PLC is drilling five production wells off Ireland this year with the Petrolia semisub, spending about $135 million on the busiest drilling program off Ireland in decades.

Drilling in Asia-Pacific has increased moderately to 241 rigs in August from 231 in January (4% increase). India led land drilling, with 57 rigs; followed by Indonesia with 39; Australia with 14; Myanmar with 7; and New Zealand and Papua New Guinea (3 each). India also hosted the largest number of offshore rigs (23), closely followed by Indonesia (21), China (19), Malaysia (17), Australia (12), Vietnam (8), Thailand (5), and others.

India's Oil & Natural Gas Corp. (ONGC) drilled 88 exploratory wells

2007 UTILIZATION OF TOP 25 US DRILLING CONTRACTORS—ONSHORE AND OFFSHORE*

Table 2

Rank	Company	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Average monthly rig use	2007 fleet	2006 fleet
1	Patterson-UTI Drilling Co. LP	281	259	260	256	254	257	256	257	260	324	309
2	Nabors Drilling USA LP	248	242	240	236	235	232	230	230	237	319	293
3	Helmerich & Payne IDC	122	125	132	135	141	142	145	148	136	164	155
4	Grey Wolf Drilling Co. LP	114	115	114	109	109	115	109	110	112	123	120
5	Unit Drilling Co.	74	72	71	72	73	72	70	71	72	81	79
6	Pioneer Drilling Co.	62	62	60	59	63	65	63	62	62	64	66
7	Nomac Drilling Corp.	48	49	50	51	54	56	57	57	53	58	57
8	Ensign United States Drilling Inc.	47	48	50	48	48	52	52	52	50	56	56
9	Bronco Drilling Co. Inc.	46	42	44	42	44	46	46	45	44	56	53
10	Union Drilling Inc.	44	42	43	42	43	42	41	41	42	52	50
11	Hercules Drilling Co. LLC	7	6	8	7	8	18	35	36	16	55	42
12	Cactus Drilling Co. LLC	37	38	38	38	37	38	38	38	38	38	38
13	Lariat Services Inc.	29	30	32	33	32	36	36	36	33	43	38
14	Trinidad Drilling LP	11	12	13	14	14	15	31	37	18	39	37
15	Unit Texas Drilling LLC	32	28	30	30	30	29	28	29	30	38	36
16	Nabors Well Services Co.	14	9	10	15	15	13	14	14	13	73	31
17	Goober Drilling LLC	1	1	11	23	25	26	28	29	18	31	29
18	Rowan Drilling Co. Inc.	25	25	26	27	27	26	26	26	26	28	27
19	Cyclone Drilling Inc.	24	23	17	17	16	17	17	18	19	27	26
20	Capstar Drilling LP	20	22	23	23	23	23	24	24	23	24	24
21	Big Dog Drilling Co.	22	22	22	22	22	22	22	22	22	23	23
22	Felderhoff Bros. Drilling LLC	19	19	18	19	19	20	21	19	19	21	22
23	Nabors Offshore Corp.	15	11	14	15	18	16	13	12	14	42	22
24	Diamond Offshore Drilling Inc.	18	18	19	20	19	19	17	17	18	21	21
25	Nabors Well Services Ltd.	8	8	7	8	9	20	17	18	12	26	21
	Active rigs	**1,368**	**1,328**	**1,351**	**1,361**	**1,378**	**1,417**	**1,436**	**1,448**	**1,386**	**1,826**	**1,675**

*Some rigs that worked earlier in the year may no longer be marketed.
Source: RigData; based on data Jan. 1-Aug. 31, 2007

and 178 development wells in fiscal 2006-07 and plans to spend $30 billion on operations over the next 5 years (OGJ, Sept. 24, 2007, p. 27).

China National Petroleum Corp. announced it will drill 700 horizontal

US ONSHORE AND OFFSHORE DRILLING ACTIVITY

Table 3

State, district	Baker Hughes's rig count – 4-week avg. – 2006	2007	Week, as of 9/14/07	9/21/07	RigData's working rigs — 4-week avg. — 2006	2007	Week, as of 9/14/07	9/21/07	Waiting to spud
Alabama	3	4	4	2	7	3	3	3	2
Offshore	1	1	1	1	1	—	—	—	—
Total	**4**	**5**	**5**	**3**	**8**	**3**	**3**	**3**	**2**
Alaska	6	5	5	5	14	12	13	12	—
Arkansas	27	49	48	48	31	52	53	52	1
Arizona	—	—	—	—	2	—	—	—	—
California	28	35	35	35	47	38	36	38	—
Offshore	4	2	2	1	—	—	—	—	—
Total	**32**	**37**	**37**	**36**	**47**	**38**	**36**	**38**	**—**
Colorado	94	116	120	114	96	119	120	117	3
Florida offshore	—	1	1	—	—	—	—	—	—
Hawaii	1	—	—	—	—	—	—	—	—
Idaho	1	—	—	—	—	—	—	—	—
Illinois	—	1	1	1	8	5	6	7	1
Indiana	1	2	1	1	4	4	3	4	—
Kansas	9	14	13	15	52	48	54	48	6
Kentucky	9	11	11	11	10	11	11	10	—
Louisiana									
North, land	57	62	60	61	60	73	72	71	2
South, land	45	27	25	26	53	42	43	40	1
Offshore	79	61	65	52	69	47	45	43	2
Inland waters	20	24	28	25	38	40	40	37	2
Total	**201**	**174**	**178**	**164**	**220**	**202**	**200**	**191**	**7**
Maryland	—	1	1	1	—	—	—	—	—
Michigan	3	2	1	1	10	11	11	11	—
Mississippi	14	12	12	11	21	24	25	23	2
Montana	18	15	13	13	28	19	19	18	—
North Dakota	37	42	40	44	42	44	45	47	—
Nebraska	—	—	—	—	2	5	4	5	—
New Mexico	91	79	75	72	92	70	68	64	1
Nevada	1	3	3	3	—	2	2	2	—
New York	7	6	6	6	5	5	5	5	—
Ohio	8	15	15	15	14	12	13	13	—
Oklahoma	193	195	197	194	222	214	222	219	8
Pennsylvania	15	17	16	16	44	42	39	41	2
South Dakota	3	2	2	2	2	2	1	1	—
Tennessee	1	5	5	5	2	4	3	4	—
Texas									
District 1	23	25	25	26	22	26	26	27	3
2	28	33	34	32	38	42	44	38	7
3	58	56	55	56	69	62	66	62	10
4	94	86	84	85	101	94	94	92	15
5	142	188	187	186	142	190	189	189	13
6	112	126	125	116	125	125	121	130	6
7b	45	37	35	38	62	51	49	49	7
7c	38	59	60	59	57	61	62	64	14
8	97	111	105	115	105	123	118	128	1
8a	25	19	18	18	41	23	20	27	1
9	36	36	36	38	44	43	43	44	3
10	78	60	58	57	81	68	68	69	—
Inland waters	3	1	1	—	6	2	2	2	—
Offshore	9	6	6	6	14	12	12	9	—
Total	**788**	**843**	**829**	**832**	**907**	**922**	**914**	**930**	**80**
Utah	45	40	40	41	47	52	53	52	1
Virginia	1	3	3	3	1	3	3	2	—
Washington	1	1	1	—	1	1	1	1	—
West Virginia	25	33	33	33	33	34	31	32	1
Wyoming	108	76	75	79	154	134	135	134	—
US deep water	—	—	—	—	46	38	36	36	—
Total	**1,744**	**1,805**	**1,787**	**1,769**	**2,165**	**2,132**	**2,129**	**2,122**	**115**

Source: RigData; a summary of data presented in the Sept. 21, 2007, edition of "LOCATION & OPERATORS" report

wells this year, up from 600 planned because of increased production over vertical wells. CNPC has increased horizontal drilling annually since 2000 and drilled 522 horizontal wells in 2006 (OGJ, Sept. 24, 2007, p. 9).

There were 270 rigs drilling in the Middle East in August, up 3% from 263 in January, according to Baker Hughes. Saudi Arabia used the greatest number of land rigs (69), followed by Oman (49), Egypt (34), Syria (20), Pakistan (19), Yemen (15), Kuwait (13), Abu Dhabi (10), and others (Fig. 4).

Only four countries were drilling offshore: Egypt (13 rigs), Qatar (10), Saudi Arabia (9), and Abu Dhabi (4).

Drilling in Africa dropped to 68 rigs in August from 69 in January. Algeria had 29 land rigs working, Libya 13, Nigeria 4, Gabon 3, Congo and Tunisia (2 each), and others. There were five rigs working off Nigeria, four off Angola, and single rigs off South Africa, Tunisia, and other countries (Fig. 5).

The North American rig count reached an historic high of 2,371 rigs in February 2007, up 5.4% from 2,248 rigs/year earlier (Fig. 2). The seasonally cyclic trend is driven by Canadian operations, but drilling is down in Canada, and the increase in rig numbers is driven by US operations.

SCORE

GlobalSantaFe Corp.'s summary of current offshore rig economics (SCORE) remained about 136 worldwide in August 2007, down 0.5% from June (OGJ, Sept. 24, 2007, p. 41). The SCORE compares the profitability of current mobile offshore drilling rig day rates to the profitability of day rates at the 1980-81 peak of the offshore drilling cycle (when SCORE = 100).

In August, the semisub SCORE decreased to 152.3, down slightly from 152.6 June, but up about 9% from a year earlier and up 266% from 5 years ago. The jack up SCORE decreased to 125, down from 127 in June, but up about 10% from a year earlier and up 170% from 5 years ago.

Regionally, the SCORE for West Africa (149, up 3.3% from a year earlier) and

North Sea (147; up 2.8% from last year) remain highest. The SCOREs for Gulf of Mexico and Southeast Asia remain nearly equal at about 120, about equal to June. Southeast Asia, however, has shown a 37.5% improvement in the previous year, while the SCORE for the Gulf of Mexico has improved only 7.7% in the past 12 months. Worldwide SCORE for all regions and rig types increased about 10% in the past year.

Belgium's Petrobel NV was drilling on the Sinai coast with Rig 92 from Sino-Tharwa Co., a joint venture between China's Sinopec and Egypt's Tharwa Co. (Fig. 4; photo from Weatherford International Ltd.).

US drilling

US drilling is on the increase, driven by activity in the US Rocky Mountains, the Piceance basin, and various shale gas plays. Rigs are migrating into the US from Canada, and newbuilds continue

to expand the fleet.

The top 50 operators, based on number of well starts, drilled 12,991 wells in the first 9 months this year, all deeper than 2,500 ft, totaling nearly 103 million ft (Table 1). This represented only 50.7% of all wells drilled through Sept. 25.

The number of directional wells was down substantially from 2006, when eight operators drilled more than 100 directional wells each (OGJ, Sept. 18, 2007, p. 37). In 2007, Williams Production RMT Co. drilled 155 directional wells and EnCana Oil & Gas (USA) Inc. drilled 96.

Thirteen of the top 50 operators drilled wells with an average footage of 10,000 ft or greater: XTO Energy Inc., EnCana, Pioneer Natural Resources USA Inc., BP America Production Co., Samson Lone Star LLC, Anadarko E&P Co. LP, SandRidge Energy Inc., Questar Exploration & Production Co., Endeavor Energy Resources LP, Comstock Oil & Gas LP, Forest Oil Corp., Henry Petroleum LP, and Cimarex Energy Co.

Patterson-UTI Drilling Co. LP and Nabors are the largest drilling contractors. Nabors's fleet is broken out among several subsidiaries: Nabors Drilling USA LP, Nabors Well Services Co., and Nabors Offshore Corp., each ranked separately by RigDesign. Patterson-UTI ran an average of 260 rigs January-August 2007, and the three Nabors companies cumulatively ran an average of 264 rigs (Table 2).

Other top drillers include Helmerich & Payne IDC (average 136 active rigs), Grey Wolf Drilling Co. LP (112 rigs), Unit Drilling Co. (72 rigs), Pioneer Drilling Co. (62 rigs), Nomac Drilling Corp. (53 rigs), and Ensign US Drilling Inc. (50 rigs).

During the past 3 years, Grey Wolf has upgraded and refurbished 17 rigs, deployed 8 new rigs, and sold or retired 15 older rigs. In September, Tom Richards, the company's chairman, president, and chief executive officer, said Grey Wolf has recently added two like-new rigs and ordered two additional new rigs.

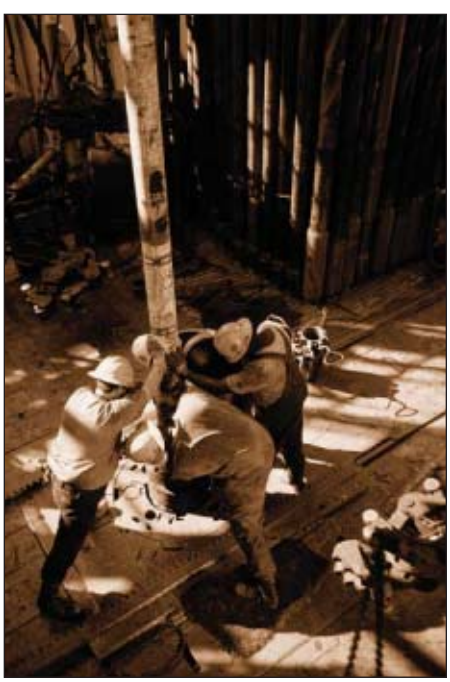
The North American land rig market has softened, but the rig counts are still higher than a year ago. For the week ending Sept. 21, 2007, the Baker Hughes rig count listed 1,684 land rigs drilling in the US (Table 3). There were also 60 rigs drilling off Alabama, California, Louisiana, and Texas, in addition to 25 rigs drilling in Louisiana's inland waters. Baker Hughes rig counts only include rigs that are "turning to the right," and so the count is conservative. BHI does not include all rigs under contract, in transit, testing, rigging up, or rigging down.

MODUs* UNDER CONSTRUCTION

Table 4

	Jack ups	Semisubmersibles	Drillships	Tenders	Total
US Gulf of Mexico	10	—	—	—	10
Europe	—	2	—	—	2
Africa	—	—	—	1	1
Middle East	12	4	—	—	16
India	5	—	—	—	5
Southeast Asia	40	17	—	2	59
Far East	12	17	24	—	53
Caspian Sea	—	1	—	—	1
Russian Arctic	1	2	—	—	3
Total	**80**	**43**	**24**	**3**	**150**
MODUs under construction by delivery date					
2007	6	1	1	1	9
2008	35	14	3	1	53
2009	29	16	8	1	54
2010	8	11	9	—	28
Undetermined	2	1	3	—	6
Total	**80**	**43**	**24**	**3**	**150**
MODUs under construction with no drilling contract					
2007	3	—	—	—	3
2008	23	2	—	—	25
2009	24	1	3	1	29
2010	8	6	6	—	20
Undetermined	2	—	3	—	5
Total	**60**	**9**	**12**	**1**	**82**

*MODU—mobile offshore drilling unit.
Sources: ODS—Petrodata Inc., Offshore Rig Locator, Oct. 3, 2007



A crew drills on Diamond Offshore Drilling's Ocean Victory semisub for BP in the Gulf of Mexico (Fig. 5; photo from BP America).

Newbuilds, offshore

About 140 new MODUs are under currently under construction worldwide (Table 4), including 72 jack ups, 43 semisubs, 19 drillships, 3 tenders, and at least 3 drilling barges. These 140 new rigs, to be delivered 2007-11, will increase the existing fleet of 782 MODUs by 18%, to 922 rigs (OGJ, Sept. 24, 2007, p. 41).

Contracts for additional newbuilds are announced almost weekly.

Simmons & Co. International analyst Ian Macpherson said that despite the additions, day rates in all but shallow-water Gulf of Mexico will remain steady and even "bleed higher" in the near future.[1]

The coming year will be decisive, he said, when more than half of the newbuilds are delivered.

M&A, IPO

The merger of Norway's Statoil ASA and Norsk Hydro ASA's petroleum businesses was finalized Oct. 1. Some service companies wonder how this will affect competitive bidding for work on the Norwegian shelf.

According to the Norwegian Petroleum Directorate, there were 44 producing fields in the North Sea and 8 producing fields in the Norwegian Sea at yearend 2006. In 2007, seven new

fields began producing, including the Snohvit field in the Norwegian sector of the Barents Sea.[2]

The NPD said operators would drill 30 exploration wells in 2007, and invest 82 billion kroner ($15 billion).[2]

General Electric Oil & Gas announced in January 2007 that it was buying drilling equipment manufacturer Vetco Gray from 3i Group for $1.9 billion (OGJ, Mar. 9, 2007, p. 72).

Australian drilling conglomerate Boart Longyear raised $1.9 billion in an initial public share offering in first-quarter 2007. Boart provides worldwide drilling services to BHP and Rio Tinto Group (produces frac proppants), among others. The company's Lang exploratory division, based in Salt Lake City, builds and operates rigs in the US, including the LM700 triple reverse-circulation rig working in the Columbia River basin for EnCana and Shell (OGJ, June 11, 2007, p. 53).

Looking ahead

Onshore, there will probably be an increased use of horizontal drilling to optimize shale and coal gas production. Due to the increasing demand for stimulation technology, more effort will probably be invested in research and development, particularly for hydraulic fracturing.

Offshore, there's a need to develop light well intervention (LWI) techniques and dynamically positioned vessels for subsea workovers—especially on the Norwegian continental shelf. Deepwater drilling vessels are too expensive to provide frequent well maintenance and optimize production. Earlier this year, Expro International announced it was working with operators to develop a rigless subsea intervention system.

BJ Tubular Services has been running a rigless intervention system in the Gulf of Mexico to decommission platforms since 2003. It operates like a modular miniderrick, with a mast 76 ft tall.

Service companies will probably bring forward similar systems in the near future. ✦

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Canadian drilling pace slows

Nina M. Rach
Drilling Editor

Fewer wells are being drilled in Canada this year, equivalent to activity 5-6 years ago. Canadian operators face escalating field costs, softening natural gas prices, gas transportation cost differentials to the US, and weakening of the US dollar.

The Canadian drilling industry suffered from a protracted spring breakup, exacerbated by newly built rigs swelling the available drilling fleet. This led to lower rig fleet utilization and movement of some rigs across the border to drill in the US Rocky Mountains. Frac equipment spreads were even relocated as far as Arkansas (OGJ, Sept. 17, 2007, p. 59).

Forecasts

On July 26, the Petroleum Services Association of Canada in an updated Canadian drilling forecast predicted a continued slowdown of drilling activity. PSAC expects 17,650 wells to be drilling across Canada in 2007, down 24% from the 23,306 wells drilled in 2006.

Among the provinces, PSAC forecasts:

- 12,815 wells in Alberta, down 27% from 2006.
- 795 wells in British Columbia, down 42% from 2006.
- 3,520 wells in Saskatchewan, down 7% from 2006.
- 440 wells in Manitoba, down 17% from 2006.
- 55 wells in Ontario, down 39% from 2006.
- 15 wells in eastern Canada (Quebec, New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland-Labrador), down 46% from 2006.

Another 10 wells will be drilled in northern Canada this year (Yukon, Northwest Territories, Nunavut), down 30% from 2006.

PSAC based its July forecast on crude oil at $65/bbl (WTI) and natural gas at $7.75 (Can.)/Mcf (AECO).

Drilling contractors

According to Precision Drilling Trust's second-quarter report, the company "experienced some of its lowest activity and equipment utilization levels in a decade." In addition to being seasonally soft, record rainfall and low gas prices in the second quarter led to a downturn in drilling activity after spring breakup. Precision's contract drilling in the Western Canada Sedimentary basin was 54% lower than during second-quarter 2006.

Coinciding with a record level of drilling rig capacity (too many new-builds?), Precision said this led to "competitive spot market pricing." The company had 13 rigs under construction at the end of the second quarter, 7 destined for Canada and 6 for the US (all supersingles). The company's North American fleet will reach 259 drilling rigs by second-quarter 2008.

Precision is building a new employee training center in Nisku, Alta., that will include a decommissioned drilling rig.

Akita Drilling Ltd. operates 42 drilling rigs, 39 in Canada and 3 in Alaska, as well as 3 well-service rigs in Canada. In the first 6 months of 2007, the company drilled 487 wells in Canada and 3 in Alaska. Akita added two heavy oil pad-drilling rigs to its fleet in second quarter, and one began operating immediately under a multiyear term contract. Management says the drop in demand has adversely affected shallow, deep, and northern rig types, but there has been minimal effect on medium-depth rigs and heavy oil pad rigs.

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Ensign Energy Services Inc. is Canada's second largest land-based drilling contractor and third largest well-servicing contractor. The fleet is operated by Ensign Drilling Partnership, consisting of five businesses: Big Sky Drilling Ltd. (Saskatchewan and Manitoba), Champion Drilling (largest driller in southern Alberta), Encore Coring & Drilling Inc. (Alberta), Ensign Drilling (Alberta and British Columbia), and Tri-City Drilling (northern and central Alberta).

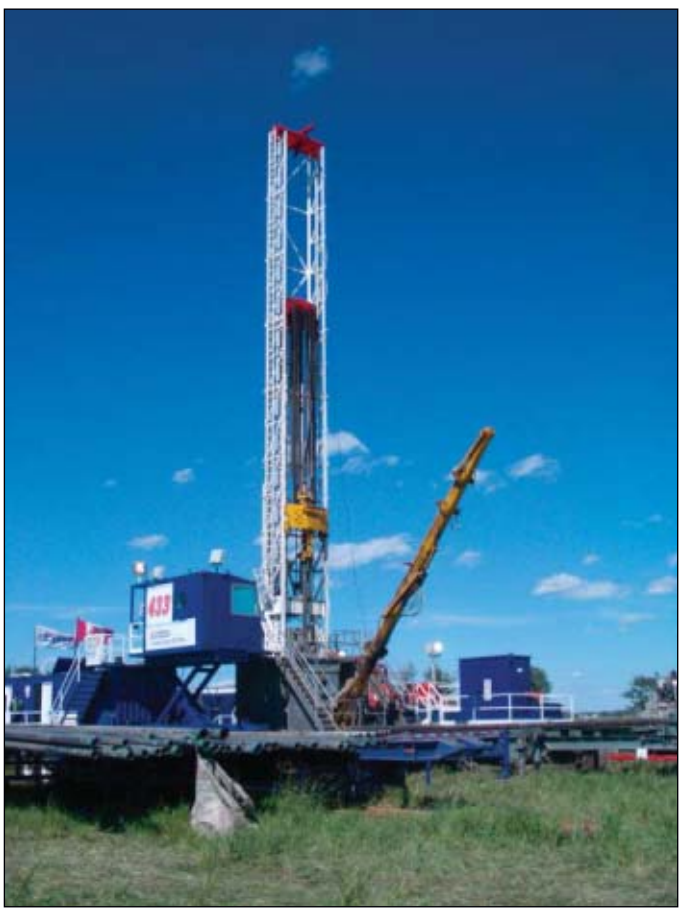
Ensign continues to expand its US fleet, adding three new automated drill rigs (ADR design) in first-quarter 2007; another five new ADRs began term contracts in second-quarter 2007 (Fig. 1). The company relocated two drilling rigs from Canada to Australia during the second quarter and is refurbishing two drilling rigs and upgrading and reactivating a previously idle drilling rig for the Middle East-Africa fleet.

Calgary's Trinidad Drilling Ltd. is also building rigs, backed by contracts, and will soon have a fleet of 110 drilling rigs ranging in depth capacity of 1,000-6,500 m, along with 22 service rigs. In July 2007, Trinidad purchased the assets of PC Axxis LLC, Drilling Productivity Realized LLC, and associated DPR companies, including four land drilling rigs, one barge rig, and a second barge rig under construction. Trinidad also acquired 20 preset and coring rigs during its earlier acquisition of Titan Surface Casing Ltd.

Calgary-based Saxon Drilling Canada Limited Partnership runs eight double drilling rigs and one single rig in Canada. Saxon Energy Services Inc. also has drilling fleets in the US, Mexico, Peru, and Colombia, and workover rigs in Venezuela and Ecuador.

In August, Saxon announced deployment of its first advanced technology single (ATS) drilling rig. The first of five new ATS rigs spud a well in July. The second rig was finished in September, and the company expects to complete one ATS rig per month for the remainder of the year. The rig fleet will then consist of 38 rigs in North America and 21 in South America, including 50 drilling rigs and 9 workover rigs.

Nabors Canada, a subsidiary of Nabors Industries Ltd., operates 97 drilling rigs across Canada, including 3 singles, 36 doubles, 49 triples, and 9 coiled-tubing hybrid rigs, capable of drilling from 1,050-7,000 m. More than a quarter of the rigs (26 of 97) have top drives, including 14 PACE rigs, four of which are helitransportable.



Calgary-based Ensign Drilling Partnership is building new automated drill rigs for term contracts in the US (Fig. 1; photo from Ensign Energy Services Inc.).

Operators drilling

According to Nickle's Rig Locator, the five busiest operators drilling in Canada at the end of September were:

- EnCana Corp., 40 rigs.
- Talisman Energy Inc., 22 rigs.
- Husky Energy Inc., 20 rigs.
- Canadian Natural Resources Ltd., 19 rigs.
- Devon Canada Corp., 18 rigs.

Western Canada

Most of Canada's drilling is in the Western Canada Sedimentary basin, predominantly in Alberta. In July, Roger Soucy, PSAC president, said that many areas in the WCSB now need natural gas prices of $8-10 (Can.)/Mcf to attract new drilling.

According to Nickle's Daily Oil Bulletin, companies have drilled 12,222 wells in western and northern Canada during January-August 2007, down 11% from 13,807 wells drilled over the same period in 2006. The fleet has had an average of 862 rigs in 2007, up from 803 rigs last year, and has operated at 43% average utilization in 2007, down from 64% utilization in 2006.

On July 23, the CAODC forecast that 16,339 wells would be drilled in western Canada this year, and said there would be a slight increase in the size of the fleet to 865 from 857 by yearend. Overall, this represents a 27% decrease in drilling (about 6,000 fewer wells) from 2006. This represents about 37,500 fewer operating days, a 24% reduction from 2006.

CAODC attributes the decrease to reduced drilling for natural gas, primarily in Alberta and British Columbia. CAODC thinks the rig fleet utilization will

be 44% for the year, with an average of 376 rigs drilling.

Historically, the average Canadian drilling rig utilization over the past 3 years has been 64%:

- 64% in 2006.
- 64% in 2005.
- 63% in 2004.

The fleet usually reaches peak utilization in February each year (Fig. 2). In February 2007, peak utilization was only 77%, down from 95% a year earlier. Peak utilization has not been this low since 2002, when it was 75%.

The drilling success rate remains high in western Canada and the percentage of dry holes in 2006 reached a record low of 4.9%. For the first 8 months of 2007, 5.8% of all wells were dry, equivalent to the midyear figure in 2006 (Fig. 3).

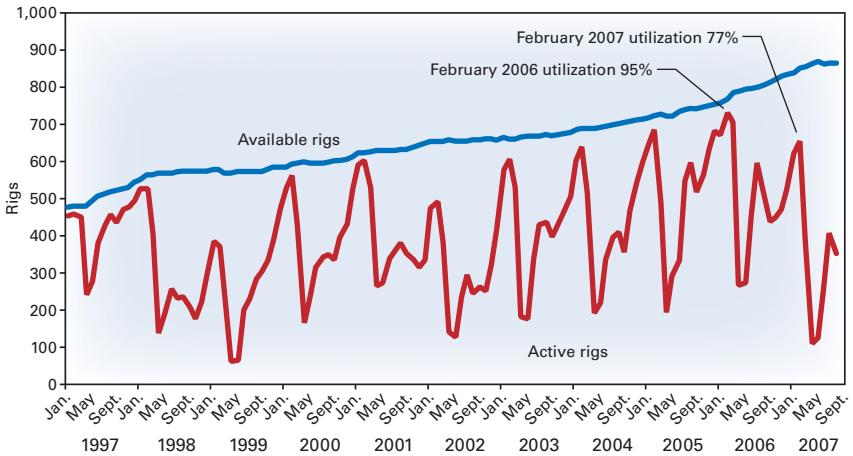
The percentage of oil drilling, relative to gas drilling, has been increasing since 2004. There were 8,088 gas wells and 3,426 oil wells drilled in the first 8 months of 2007, about 2.4 gas wells/oil well. This compares with previous years:

- 2.7 gas/oil wells in 2006.
- 3.2 gas/oil wells in 2005.
- 3.5 gas/oil wells in 2004.

The lower 2007 figure may be attributed to Canadian gas prices, which are not keeping pace with the rise in oil prices. There is no energy parity; gas is now trading at a substantial discount to oil in terms of its energy value.

WESTERN CANADA DRILLING ACTIVITY

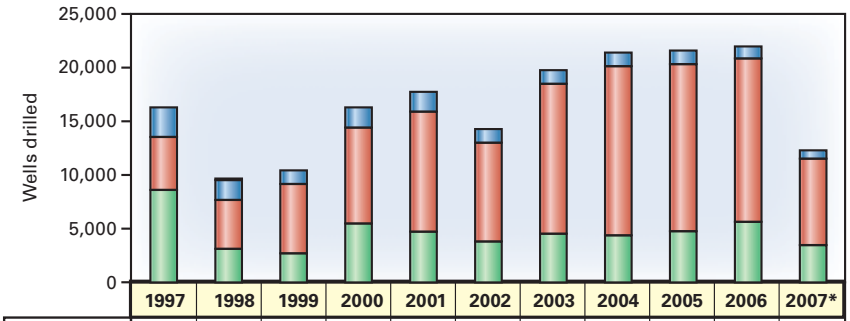
Fig. 2



Source: Nickle's Energy Group, Rig Locator

WESTERN CANADIAN OIL, GAS WELLS

Fig. 3



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007*
Dry, %	17.2	19.3	13.6	11.7	10	9.1	6.3	5.9	6.5	4.9	5.8
Dry	2,777	1,850	1,427	1,903	1,759	1,289	1,233	1,266	1,414	3,426	3,426
Gas	4,857	4,585	6,309	8,934	11,177	9,073	13,944	15,645	15,359	3,426	3,426
Oil	8,558	3,142	2,730	5,462	4,689	3,832	4,473	4,427	4,822	5,599	3,426

*Through August 2007
Source: Nickle's Daily Oil Bulletin, Canadian Assoc. of Oilwell Drilling Contractors

In a presentation to the Canadian Association of Drilling Engineers, Paul Ziff, chief executive officer of Calgary's Ziff Energy Group, showed that Canadian gas drilling is down 40% this year, and gas well completions are down 19%. "Current Canadian gas rig activity is barely above the levels of 6 years ago, while US drilling activity is 50% higher."[1]

Ziff said "Alberta gas economics for new gas activity are at a significant disadvantage compared to most US gas basins."[2]

Alberta royalties

On Sept. 18, the six-member Alberta Royalty Review panel issued its final report on hydrocarbon royalties to the provincial government. The report states that Alberta is not receiving a fair share and recommends increasing royalties on oil sands, conventional oil, and natural gas production.[3] Natural gas royalties would rise to 63% from the current 58% royalty, conventional oil to 49% from 44%, and most dramatically, oil sands to 64% from 47% (Table 1).

In a Sept. 24 press release, Ziff said, "Although the western Canada public perception is of an oil and gas industry, the reality today is a predominantly natural gas conventional industry alongside the burgeoning unconventional oil sands industry." Ziff said gas drilling has accounted for 75% of conventional drilling in western Canada in the last several years.

Bill Gwozd, vice-president of gas services at Ziff Energy Group, said that the proven gas reserve life (current production divided by remaining proven reserves) in Canada is less than 9 years, and he said maintaining current production is unlikely, given the amount of drilling required. He told OGJ, however, that probable and potential reserves represent about 15 years of production, for a total of 24 years of gas production remaining in western Canada.

Gwozd said that western Canada is producing about 16.6 bcfd, and he expects it to decline to 13.1 bcfd by 2015, based on Ziff's proprietary supply numbers. Western Canada produces about 6 tcf/year and holds an ultimate resource of 300-350 tcf. He noted that the reserves estimate has plateaued in the last 5-10 years, despite increased exploration and drilling. With finite resources and declining production, Gwozd said, the gas supply to the US will naturally decrease and will probably be replaced by production from the US Rocky Mountains or newly arriving LNG.

Ziff Energy Group ultimate resource analyses are based on studies by the Canadian Gas Potential Committee, a volunteer organization of geoscientists and engineers that conducts a study every 3 years and other industry resource assessments. The National Energy Board and pipeline companies also examine the industry, with the result that at least one study is released each year.

ALBERTA ROYALTY REVIEW

Table 1

	Current		Recommended	
	Alberta	Developer	Alberta	Developer
	Share, %			
Oil sands	47	53	64	36
Conventional oil	44	56	49	51
Natural gas	58	42	63	37

Off Newfoundland

The Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) released its 2006-07 annual report on June 21, detailing activities in the province.

The Rowan Gorilla VI jack up drilled four delineation wells and one exploration well on the Grand Banks for Husky Oil during the April-November 2006 drilling program:

- White Rose O-28X, O-28Y.
- West Bonne Bay F-12, F-12Z.
- North Amethyst K-15 exploration well.

The Eirik Raude semisubmersible spudded the Great Barasway F-66 exploration well in the Orphan basin in August 2006, but tensioner wires in the marine riser parted in January 2007 and resulted in a spill of 74,000 l. of synthetic-based mud (SBM). After repairs in Marystown, Newf., the rig reconnected to the well in March and completed the well.

- **Hibernia.** The field is about 300 km east-southeast of St. John's, Newf., the Hibernia Management & Development Co. Ltd. (HMDC) drilled four development wells and one delineation well from the Hibernia platform during the fiscal year ending Mar. 31, 2007.

Through March, 56 of 64 drilling slots on the platform had been used, and the field had produced 531 mil-

lion bbl oil, with 713 million bbl oil remaining. The Hibernia field was shut down from September 2006 to February 2007 because of a backfire in the turbine exhaust unit on one of the main power generators.

About 97% of the gas produced at Hibernia was used for fuel or oil recovery in 2006; only 3% (2,424 MMscfd) was flared. Hibernia uses a cuttings reinjection system and successfully reinjected 100% of all SBM cuttings in 2006.

• **Terra Nova.** The field lies 350 km east-southeast of St. John's where the Henry Goodich semisubmersible had drilled 32 wells through the end of March for Petro-Canada and its partners. After completion of another well in May, the 28 drilling slots were fully utilized. Drilling at Terra Nova will resume in 2011 when additional drilling slots become available, according to C-NLOPB.

About 78% of the gas produced at Terra Nova was used for fuel or oil recovery in 2006; 22% (84.9 million cu m) was flared.

• **White Rose.** The field is about 350 km east of St. John's and produced 32 million bbl oil in 2006 from six production wells, about 87,800 bo/d. Husky Oil has initiated drilling operations on 19 wells; 16 of which have been drilled to TD and 15 completed. In 2006, Husky drilled two delineation wells in the field with the GSF Grand Banks second-generation semisubmersible.

About 39% of the gas produced at White Rose was flared in 2006 (270 million cu m). C-NLOPB attributes the high percentage to the typically high rates seen at the beginning of oil production. Gas injection into the field began May 5, 2006.

On Sept. 7, 2007, C-NLOPB approved Husky Energy's South White Rose extension. The South White Rose extension is estimated to contain 24 million bbl of oil and is one of several possible extensions to the White Rose project.

According to the C-NLOPB annual report, operators produced a total of 111 million bbl oil in 2006, valued at more than $8.2 billion (Can.), representing 12.6% of Newfoundland and Labrador's gross domestic product. The industry spends about $1.3 billion (Can.) a year across Canada, 55% of it in Newfoundland and Labrador. As of Mar. 16, 2007, operators were committed to spend an additional $816 million (Can.) on future exploration activities.

During 1966-2006, operators spent nearly $21.6 billion (Can.) on offshore petroleum exploration, development, and production in the province. About half, $10.7 billion, has gone towards development activities.

Western Newfoundland

According to the August 2007 oil and gas report from the Newfoundland

The top drive of the XTC 400 coil-over-top-drive rig can swing in and out of the derrick (Fig. 4; photo from Xtreme Coil Drilling Corp.).

and Labrador Dept. of Natural Resources, another well may be drilled in western Newfoundland this year.

In September, Houston-based Tekoil and Gas Corp. announced a farm-in agreement with St. John's-based Ptarmigan Resources Ltd. and has received operating and exploration licenses from the provincial government. Tekoil plans to drill a well just north of the Port au Port peninsula to validate the second term of Ptarmigan's offshore exploration license 1069. Tekoil will earn a 33% working interest in EL-1069 upon completing the well.

Off Nova Scotia

The Canada-Nova Scotia Offshore Petroleum Board (CNSOPB) issued its 2006-07 annual report in July 2007. The board authorized a single drilling program during the fiscal year ending Mar. 31, 2007, but there were no exploration wells drilled during the year. One development well, Alma 3 (N-76), was completed.

The period 2006-07 set a record for drilling deposits, however. The CNSOPB report lists six new $250,000 (Can.) drilling deposits posted for exploration license (EL) areas 2404 (Norsk Hydro Canada Oil & Gas Inc.), 2406 (Canadian Superior Energy Inc.), 2407 (BEPCo. Canada Co.), 2412 and 2413 (Richland Minerals Inc.), and 2414 (EnCana Corp.). There are 17 additional exploration licenses open, with a total committed work expenditure of $902 million (Can.). Two EL areas, 2401 and 2408, were forfeited during the year.

CNSOPB issued two significant discovery licenses to EnCana (SDL 2701, 2702) for its Deep Panuke gas development project on July 27. EnCana is awaiting regulatory approvals from the CNSOPB and the National Energy Board to begin operations.

Onshore Nova Scotia

Triangle Petroleum Corp. began drilling gas shales in Nova Scotia in September. Triangle contracted Precision Drilling Rig 176 to drill two vertical wells in the Windsor basin, beginning with the Kennetcook No. 1 well. Estimated TD is 1,350-1,500 m, targeting the Mississippian Horton Group shales. The wells will be completed in October.

Calgary-based Contact Exploration Inc. farmed out the Windsor block to Triangle in June 2007. Triangle can earn the right to 70% of Contact's 516,000-gross acre Windsor block by completing the Kennetcook No. 1 well. Contact has an interest in 1.5 million acres onshore Nova Scotia.

Triangle also has an option to earn a working interest in Contact's 68,000-acre shale gas horizon in New Brunswick, according to a Sept. 6 press release.

New Brunswick

Contact Exploration holds 165,000 acres onshore New Brunswick. The company drilled its South Stoney Creek prospect in southern New Brunswick in August. The Shenstone G75-2328 well reached a TD of 2,180 m (rig capacity), nearly to the planned TD of 2,200 m. It is the first of two wells proposed on the 35,000 acre prospect.

Contact said the objective of the well was to test the Hiram Brook, Fredericks Brook, and Dawson Settlement formations. Contact has 60% of the field; a partner holds 40% working interest.

Contact began producing its 100%-owned Stoney Creek field in June, with 750 bbl in the first month and 900 bbl in July. The field has estimated reserves of 1.2 million bbl oil and 6.5 bcf natural gas and the company plans to rework 14 vertical wells, pending approval (OGJ Online, Aug. 27, 2007).

Canadian R&D

Calgary's Xtreme Coil Drilling Corp. is a drilling contractor developing and operating coil-over-top-drive (COTD) drilling rigs that can handle coil or jointed drill pipe. According to the company's presentation at the Peters 2007 North American Oil & Gas Conference in September, six COTD rigs were in the US and two in Canada.

XTC 200ST Rig 5 is moving to southern Alberta for a multiwell project, and XTC 300 Rig 11 is commissioning in Nisku. The US-based rigs are working in the DJ basin and Piceance basin, Colo. (OGJ, June 25, 2007, p. 45).

Xtreme has five different models of CT drilling rigs. The two smallest, XTC 200ST and 200DT, can drill to about 7,900 ft. The XTC 400 can drill to 10,000 ft with 3½-in. coiled tubing or to 14,000 ft with jointed drill pipe (Fig. 4).

As of June 30, the company had 11 rigs under construction and expected to complete 14 rigs by yearend. The fleet will include 10 rigs by the end of third quarter and expects to run 18 COTD rigs in 2008.

Xtreme is also engaged in a joint venture, Coil-X Drilling Systems Corp., with Shell Technology Ventures Fund 1 BV.

Acquisitions

Earlier this year, Abu Dhabi National Energy Co. PJSC (ABNEC) purchased Calgary-based Northrock Resources Ltd., a subsidiary of Houston's Pogo Producing Co., for $2 billion (OGJ, June 11, 2007, p. 32). Northrock had properties in Alberta, Saskatchewan, and Northwest Territories.

In August, ABNEC purchased a second company with Canadian assets, Pioneer Natural Resources Canada Inc., for $540 million (OGJ, Sept. 24, 2007, p. 29).

Canadian Beaufort

Imperial Oil Resource Ventures Ltd. and ExxonMobil Canada Properties have jointly bid and won exploration rights for EL 446 in the Canadian Beaufort Sea for $585 million (Can.). The parcel covers 507,368 acres, about 160 miles north of Inuvik, NWT. The companies need to spend 25%, or $73.1 million (Can.), within 5 years to earn a 4-year license extension (OGJ Online, July 19, 2007).

ConocoPhilips Canada Resources Corp. bid $12.08 million (Can.) for EL 447, consisting of 256,270 acres, 85 miles north of Inuvik.

Chevron Canada Ltd. bid $1 million (Can.) for the 267,325 acres in EL 448, 120 miles north of Inuvik.

Devon Canada completed a wildcat in the Canadian Beaufort last year.

Successfully exploring and exploiting the technology-intensive Beaufort will probably depend on the growth of the Mackenzie delta gas project and construction of the Mackenzie gas pipeline.

Drilling ahead

How will the industry adjust to the drilling downturn in Canada? Adjust royalty programs to encourage drilling by recognizing the front-end risks and costs.

British Columbia's provincial government has introduced a net profit royalty program to encourage exploration of coalbed methane, tight gas, shale gas, and enhanced oil recovery projects. The new royalty will be 2% of gross revenue from the start of production over a maximum 10-year period or until the initial capital investment is paid off. The asset then follows one of three tiers:

- 5% of gross revenue or 15% of net revenue, whichever is higher, until capital cost + 30% is recovered.
- 5% of gross revenue or 20% of net revenue, whichever is higher, until capital cost + 105% is recovered.
- 35% on net revenue or 5% on gross revenue, whichever is higher.

The new royalty structure in British Columbia is modeled on Alberta's current oil sands royalties (currently under review, as discussed above).

Royalty on Alberta oil sands is 1% of gross revenue until project payout, after which the rate is either 25% of net revenue or 1% of gross revenue, whichever is larger.[4] ✦

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3. "Our Fair Share," 104 pp., www.albertaroyaltyreview.ca.

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BTX: PROBLEM AND SOLUTION—1

Activated carbon eliminates Claus deactivation problem

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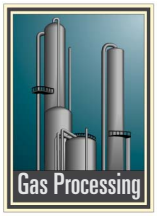

As have other operators with lean feed acid gas containing benzene, toluene, and xylene (BTX), Saudi Aramco has dealt for years with chronic Claus catalyst deactivation, low sulfur recovery, and frequent shutdowns to replace catalyst.

After a process selection study identified the most cost effective solution to the problem, the company installed regenerable activated-carbon beds upstream of the sulfur-recovery units (SRUs) to remove aromatic contaminants before they reach the converter beds. Saudi Aramco completed construction of seven BTX-removal units to treat acid feeding downstream sulfur plants in December 2005. Commissioning took place in spring 2006.

Part I of this two-part series discusses the history of the BTX problem and how it was eventually addressed. A process description provides an understanding of the steps in the cyclic regeneration process. The concluding article will discuss design issues and start-up and commissioning experience for the units, their performance, and impact on the downstream Claus catalyst.

Master Gas System

For years Saudi Aramco faced rapid and chronic Claus catalyst deactivation induced by aromatics in feed acid gas at two of its largest gas plants. Until the late 1970s, solution gas produced with crude oil ("associated gas") was flared. To make use of this resource, the Kingdom directed Saudi Aramco to gather and process this gas into fuel gas and NGL products. The capital-spending program to accomplish all this was called the Master Gas System.

Selecting an amine to treat sour associated gas to a ¼ grain H_2S/100 std. cu ft pipeline specification was one of many design goals. It's easy to forget sometimes how far the gas processing industry has come in the last 30 years in terms of understanding the capabilities and limitations of various amines. At that time, process simulators were in their infancy and the extensive database of thermodynamic and kinetic properties for many amines used today did not exist.

The selection process that led to choosing Diglycolamine (DGA) is described by Huval and van de Venne (OGJ, Aug. 17, 1981, p. 93). Their article mentions a concern that DGA would be prone to coabsorption of heavy hydrocarbons, which could lead to poor sulfur product quality. It also describes how fuel-gas spargers were installed in the bottom of the rich-amine flash drum to mitigate this. Because of its other advantages, though, primarily the ability to treat sour gas at high temperatures, it was selected for the Master Gas System.

Because DGA removes essentially all H_2S and CO_2 from treated gas, the H_2S:CO_2 ratio in acid gas is determined by the ratio of these components in the sour gas. At Saudi Aramco's Shedgum and Uthmaniyah gas plants, this results in an acid-gas composition of 17-30% H_2S. For these low levels of H_2S, a reaction furnace bypass is necessary even after preheating the air and acid gas in fired preheat furnaces.

About half the acid gas bypasses the furnace. Hydrocarbons co-absorbed by the DGA solution and transferred to the acid gas make their way via the bypass to Claus catalyst in the converters (Fig. 1).

Seven 400-tonne/day SRUs were built as part of the Master Gas System at Shedgum and Uthmaniyah. From the time the gas plants were commissioned, Claus catalyst life was noticeably shorter than expected.

In 1984, a new source of nonassociated gas from the Khuff reservoir was

Based on a presentation to the 57th Laurance Reid Gas Conditioning Conference, Norman, Okla., Feb. 25-28, 2007, and updated to reflect recent operating experience.

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introduced to the plants. Immediately the sulfur trains began to experience much faster deactivation of the catalyst, especially in the first converters. Subsequent measurements on Khuff gas showed it had a significantly higher BTX content than associated gas.

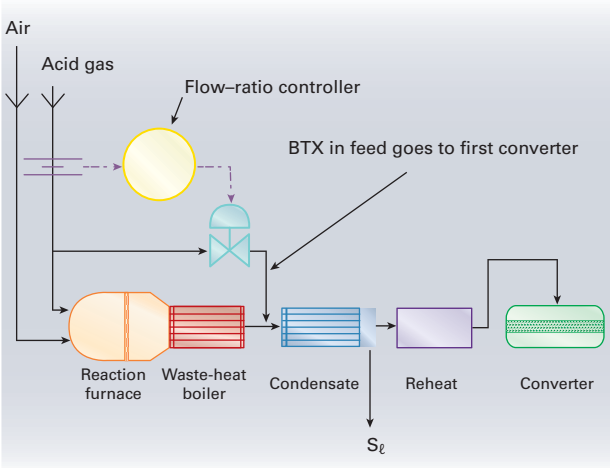
It was determined that 10-15% of the BTX in sour gas is transferred to acid gas by the treating units. Some of these aromatic compounds reach the converters through the reaction furnace bypass. There, they crack on active sites inside the Claus catalyst pores, leaving coke deposits that prevent further reaction at those sites. As more and more active sites are blocked, the catalyst progressively loses activity.

Over the next several years, it was necessary to perform periodic catalyst regenerations to restore performance. This procedure involves operating the converter at elevated temperature with a slight excess of oxygen in process gas to burn off coke deposits.

While this procedure is normally anathema for sulfur-plant operators, it was the only way to restore partial catalytic activity until the next planned shutdown to change catalyst. Even with this aggressive practice, it was still not possible to maintain 95% sulfur recovery over 2 years.

SRU WITH REACTION FURNACE BYPASS

Fig. 1



Process selection study

Evolving environmental awareness and regulations mandated that a solution be developed that would allow the SRUs to operate as designed. More stringent emissions limits were on the horizon and before process retrofits could be considered, catalyst deactivation had to be definitively addressed.

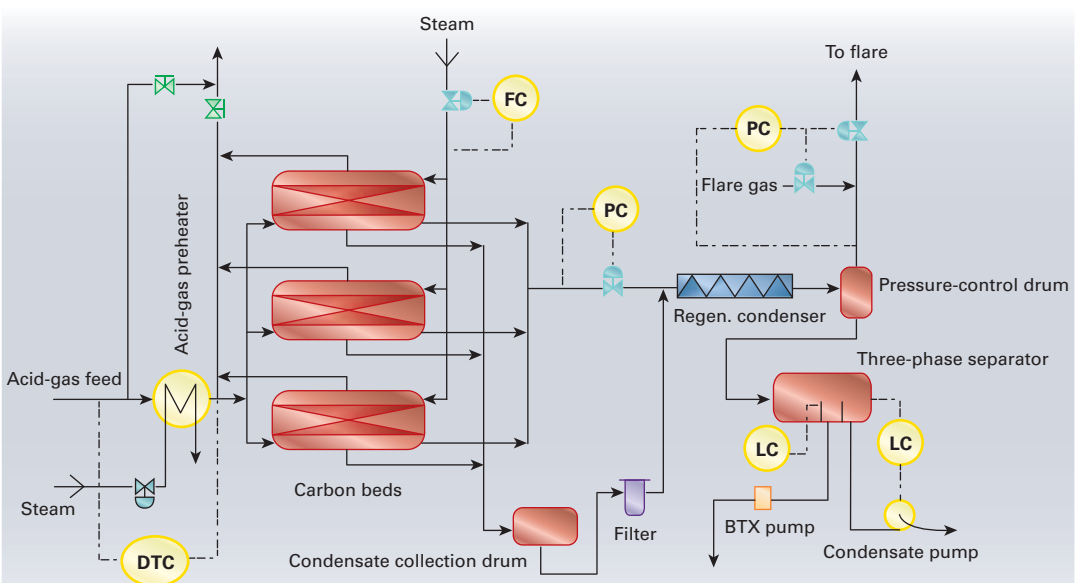
In 2000, Saudi Aramco's engineering staff undertook a comprehensive process selection study to establish unequivocally the direction to be taken to resolve the BTX issue. After years of discussing the matter with engineering companies, technology providers, and consultants, our belief was that there was no one better suited to evaluate the merits of competing alternatives. In addition, by doing all cost estimating under the umbrella of a single study, we could be certain that all economic inputs were on a common basis. Several alternative processes and solutions had been proposed over time to address the problem. Our process selection study evaluated the following possibilities:

- Oxygen enrichment.
- Fuel-gas cofiring.
- Changing the upstream sour-gas treating amine.
- Refrigerating the feed.
- BTX adsorption from acid gas using molecular sieve.
- Acid-gas enrichment.
- Fuel-gas stripping.
- BTX adsorption from acid gas using regenerable activated-carbon beds.

In the end each of these was rejected as being either technically infeasible or more

PROCESS FLOW*

Fig. 2



*DTC = differential temperature control; FC = flow control; PC = pressure control; LC = level control.

costly than the carbon-bed process.

Following are the reasons for each being discarded:

Oxygen enrichment does not provide a hot enough flame temperature. For the very lean feed in the design basis, even at 100% O_2 enrichment with all acid gas going to the reaction furnace, the calculated flame temperature is barely enough to maintain a stable flame, let alone destroy BTX. Fuel gas cofiring would require so much fuel gas that it would have doubled the SRU pressure drop.

Refrigerating the feed to condense out heavy hydrocarbons would be prohibitively costly in a location where all heat rejection is ultimately to the atmosphere with a 120° F. design ambient temperature.

Use of molecular sieve was actually considered after the fact; that is, after the carbon-bed process was chosen. Carbon is a better adsorbent in that it has a higher capacity for BTX than sieve and perhaps more importantly it can be regenerated with low-pressure steam, whereas sieve requires a fired heater to raise the temperature of the regeneration medium.

Fuel-gas stripping the rich amine and acid-gas enrichment were evaluated in detail. For the stripping process, it was proposed to route the fuel gas to the site's utility boilers. This set an upper bound on the stripping fuel gas-to-amine circulation rate ratio.

For these conditions, the amount of xylene that could be removed was much less than could be achieved with either carbon adsorption or acid-gas enrichment. It had been established that xylene is by far the most destructive of the aromatics in our acid gas.[1] As a result, fuel gas stripping was pursued no further.

It was found that removal of BTX from acid gas by regenerable activated carbon was, by a very wide margin, far less costly than the only technically viable alternative process, acid-gas enrichment. The results of our study were presented in 2002.[2] In the course of the study we dispelled two misconceptions that were generally held within the gas processing community and by ourselves up until then.

The first has to do with the idea that DGA would co-absorb significantly more heavy hydrocarbons than other commonly used amines because of the di-glycol component of the molecule. While this may be directionally true, the importance of the effect has been overstated. In reality water in a DGA solution is responsible for picking up a large proportion of the aromatics from sour gas.

This seems counter intuitive at first until one realizes that on a molar basis, water makes up about 85% of the circulating solvent. Since solubility is a molecular phenomenon, it stands to reason that pickup of BTX in the absorbers would depend on the ratio of

In the left foreground of this view of one of the carbon units, the regeneration condensate three-phase separator sits above the condensate-collection drum. To the right of these are the three carbon-adsorption-bed vessels (Fig. 3).

moles of water to amine in contact with the gas being treated.

Of course, pressure plays an important role as well. When Khuff gas treating at high pressure began in the early 1990s at Shedgum, the SRU receiving acid gas generated from high-pressure treating suffered even more rapid catalyst deactivation.

Because Henry's law applies, treating at high pressure transfers more BTX than at low pressure. This is not to suggest that there are not other factors involved. For example, we have observed that increasing acid-gas loading decreases BTX pickup.

The point remains, however, that the concern regarding DGA relative to other amines misses the essential fact that water, because its molar concentration, contributes significantly to the pickups of aromatics and heavy hydrocarbons in any amine treating process.

The second is related to the attempt to mitigate the concern regarding DGA solution coabsorption of BTX by installing fuel-gas spargers in the rich-amine flash drum (OGJ, Aug. 17, 1981, p. 93). The concept was that this would perform a physical striping of heavier hydrocarbons from the rich solution.

We reported in 2002 that even using a very high fuel-gas striping rate (relative to amine circulation) and a multistage tower would not be sufficient to cut net aromatics transfer by the order of magnitude necessary to eliminate BTX induced deactivation.[2] Hoping to achieve this in the single stage provided by the rich amine flash drum, although directionally valid, was unrealistic.

Thus in 2001 Saudi Aramco undertook to construct seven BTX-removal units upstream of the SRUs with reaction furnace bypasses at Shedgum and Uthmaniyah. There were some further internal reviews and admittedly tough discussions as we proceeded. After all, nowhere else in the world had the process ever been implemented on the massive scale being contemplated.

Nonetheless over the next 5 years, the project evolved through initial scoping, preliminary and detailed design, procurement, construction, and commissioning, culminating in startup during first-quarter 2006.

As the project scope was being defined, the design basis was modified somewhat from what was presented in 2002. The changes reflected the latest projections for capacity needs and BTX content of the acid gas. The carbon units were designed for the following feed basis: acid-gas flow 65 MMscfd, feed pressure 13 psig, feed temperature 100° F., and total BTX content slightly more than 500 ppm (vol).

Process

Fig. 2 shows a schematic of the process. Acid gas from the gas-treating units is cooled in a scrubber with chilled circulating water. From there it goes to an adjacent knockout drum where free liquid disengagement takes place (not shown).

The carbon-bed unit (CBU) is fitted with a bypass so that it can be taken offline and the SRU left in service. During normal operation, acid gas from the knockout drum goes to a preheater. Adsorption of aromatics on carbon is favored at low temperature. There is a competing effect, however: At high relative humidity, water tends to adsorb preferentially to BTX.

The shell and U-tube exchanger uses low-pressure steam to heat the acid gas before going to the carbon-bed vessels. The amount of preheat is set so as to bring the relative humidity of the acid gas to around 50%. This corresponds to a ΔT of about 20-25° F. between winter and summer conditions.

The CBUs were designed with a three-bed configuration with two vessels online at any time with one in regeneration or standby. Removal of BTX using activated carbon is similar in many respects to molecular-sieve dehydration: Both are governed by the fundamental principles of adsorption.

For BTX removal, adsorption takes place with acid gas in upward flow. Regeneration is performed with downward flow of steam, which eliminates the possibility of steam condensing and refluxing on the bed if the opposite flow regime were used. Acid gas passing through the two carbon beds online is stripped of aromatic contaminants and flows to the fired acid-gas preheater upstream of the SRU. The CBUs were built for full stream treatment of acid gas, not just the reaction furnace bypass.

Carbon has a finite capacity to hold hydrocarbons. When the bed is online

(adsorption mode) the mass-transfer zone (MTZ) moves from the bottom to the top of the bed. Behind (below) the MTZ, the carbon is saturated to capacity with BTX. Ahead of the MTZ the bed is essentially free of adsorbed aromatics.

Eventually the bed becomes fully loaded with hydrocarbons as the MTZ reaches the top of the bed. Before this happens the bed is taken out of service and regenerated with low-pressure steam. When a bed is taken off line it is replaced in service with a previously regenerated bed.

During regeneration, steam is introduced under flow control to the top of the bed through a distributor. The regeneration pressure is maintained by a backpressure controller on a common line connecting the beds. After the pressure-control valve, steam and desorbed aromatics are condensed in an air-cooled fin-fan heat exchanger.

From there a three-phase mixture of regeneration steam condensate, hydrocarbon liquids, and some noncondensables goes to the pressure-control drum. Liquids flow by gravity to a three-phase separator below.

As its name implies, the pressure-control drum serves to maintain a net positive pressure in the three-phase separator despite the vacuum that is naturally formed when regeneration steam is condensed in the fin-fan cooler. This is achieved with a split-range pressure controller that vents noncondensables to the acid-gas flare header as they build up at the start of regeneration and a fuel-gas supply that pressurizes the vessel when condensing steam would otherwise pull a vacuum.

The amount of noncondensables and hydrocarbon liquids coming to the pressure-control drum varies throughout the course of the regeneration step. Initially there is a physical displacement of trapped acid gas in the vessel that is isolated at the end of the adsorption step.

As the bed is heated to the regeneration temperature, hydrocarbons begin to desorb from the bed, reaching a maximum which then trails off like the elution peak of a chromatogram. The three-phase separator has water and hydrocarbon compartments that are pumped out under level control.

Water is sent to a new waste water stripper designed to treat produced regeneration steam condensate to boiler-feed-water quality. BTX from the three-phase separator is injected into crude oil. The amount of aromatics produced is insignificant compared to oil production and has no measurable effect on the latter.

One final point regarding the regeneration step is to explain the function of condensate collection drum that comes into play in the initial stages of this step. Adsorption takes place at temperatures that range 80-140° F. winter to summer. Regeneration back pressure can

be controlled between 20 to 50 psig, which corresponds to a temperature range of around 260-300° F. (Note that the superheat in letting down low-pressure steam from about 65 psi to regeneration pressure is immediately dissipated.)

When steam is first introduced to the carbon-bed vessel, it will condense as the bed, vessel, and internals are heated to the regeneration temperature. This condensate is removed from a center nozzle at the bottom of the vessel.

From there it flows by gravity to a small condensate-collection vessel. At a preset level, the condensate is expelled through a filter to remove carbon fines. From there it joins the main regeneration-steam line, downstream of the regeneration backpressure control valve and before the regeneration steam condenser (Fig. 2).

Fig. 3 shows one of the carbon units with all major vessels. ✦

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Model increases liquids lines' exhaust efficiency

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A new model has increased the efficiency and safety of air-exhaust procedures in the commissioning of liquids pipelines in hilly terrain.

Air accumulated in a pipeline during commissioning can damage it and make interface tracking in batch transportation difficult, requiring the air's efficient discharge. Such accumulation frequently occurs in long-slope pipe segments in hilly terrain, increasing the importance of determining the size and location of any air pockets in these settings.

In traditional commissioning procedures, determining the location of the air mass and the time of its exhaust relied on the use of pressure devices: If air intake occurred, the entire transport line would shutdown and exhaust the air at the pipeline's peaks. This method of air exhaust was passive and time consuming and led to greater quantities of contaminated product.

This article applies both fluid mechanics theory and multiphase flow theory to analyze the formation and movement of intake air encountered during commissioning of the China West Products Pipeline. It presents equations for calculating the location and length of intake air in the pipeline in an effort to provide theoretical support for accurately determining air exhaust in the commissioning of future hilly terrain pipelines.

The resulting model allows air mass pressure, length, and location to be calculated under normal transportation conditions for other pipelines. The calculation results show a certain distance between where air stagnates and the pipeline's next peak. Using the model in practical applications can move the air to the predesigned air exhaust points by regulating liquid flow rate and pressure.

CWPP commissioning

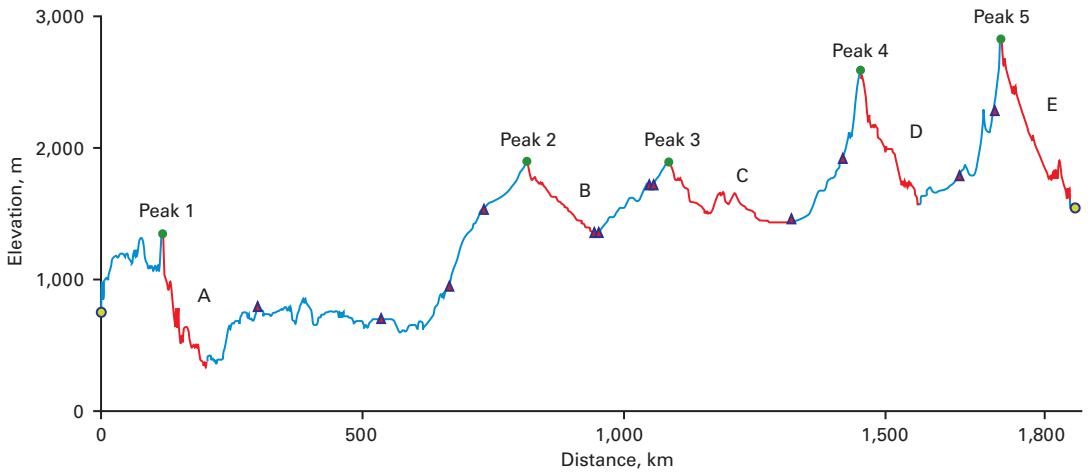
The number of pipelines in China has increased rapidly in recent years. These pipelines are typically large diameter, high pressure, and high throughput, with the majority built in hilly areas. CWPP is one of the longest and most complex.

CWPP consists of both the China

CHINA WEST PRODUCTS PIPELINE Fig. 1

CWPP TERRAIN GEOMETRY

Fig. 2



West Products Pipeline and China West Crude Oil Pipeline, constructed in one ditch. The main line runs from Urumchi, Xinjiang province in western China, to Lanzhou, Gansu province in central China, passing through two provinces and 21 cities (Fig. 1). CWPP is 1,858 km long, with six distribution stations and 50 cutoff valves. Its designed throughput is 10 million tonnes/year of gasoline and diesel.

CWPP's commissioning differed from previous pipeline start-ups in China. Operators usually first fill the pipeline entirely with water, with all pressure devices, valves, pumps, and other transport equipment then adjusted. When everything works well, the operator then fills the pipe with oil products, displacing the water. This method al-

EQUATIONS

$$\varphi = -\frac{1}{\pi}\left(\beta - \frac{1}{2}\sin 2\beta\right) \quad (1)$$

$$\frac{\pi^2 f/f_0}{\beta^2\left(1 - \frac{\sin 2\beta}{2\beta}\right)^{10/3}} = \frac{dz/dx}{\frac{f_0 v_0^2}{2gD}} \quad (2)$$

$$M = \rho_0\left[1 - \frac{1}{\pi}\left(\beta - \frac{1}{2}\sin 2\beta\right)\right]AL_0 \quad (3)$$

$$\text{Air phase: } \varphi\frac{dp}{dx} = \varphi g\rho_g \sin\theta - \frac{\tau_g S_g}{A} + \frac{\tau_i S_i}{A} \quad (4)$$

$$\text{Liquid phase: } (1-\varphi)\frac{dp}{dx} = (1-\varphi)g\rho_l \sin\theta - \frac{\tau_l S_l}{A} - \frac{\tau_i S_i}{A} \quad (5)$$

$$\tau_g = \frac{f_g \rho_g v_g^2}{2};\ \tau_i = \frac{f_i \rho_g (v_g - v_l)^2}{2};\ \tau_l = \frac{f_l \rho_l v_l^2}{2} \quad (6)$$

$$\begin{cases} f_l = \dfrac{16}{Re_l} & Re_l < 2{,}000 \\ \dfrac{1}{\sqrt{f_l}} = 3.48 - 41g\left(\dfrac{2e}{D} + \dfrac{9.35}{Re_l\sqrt{f_l}}\right) & Re_l > 2{,}000 \end{cases} \quad (7)$$

$$g\rho_l \sin\theta - \frac{\tau_l S_l}{(1-\varphi)A} - \frac{\tau_i S_i}{(1-\varphi)A} = \frac{\tau_i S_i}{\varphi A} \quad (8)$$

$$\frac{0.0142\rho_{ag}Q^2 D\sin\beta}{2\left[\frac{1}{\pi}\left(\beta - \frac{1}{2}\sin 2\beta\right)\right]^2\left[1 - \frac{1}{\pi}\left(\beta - \frac{1}{2}\sin 2\beta\right)\right]} =$$

$$A^3 g\rho_l \sin\theta - \frac{2\mu_l D^2\beta^2 Q}{\left[\frac{1}{\pi}\left(\beta - \frac{1}{2}\sin 2\beta\right)\right]^3} - \frac{0.0142\rho_{ag}Q^2 D\sin\beta}{2\left[\frac{1}{\pi}\left(\beta - \frac{1}{2}\sin 2\beta\right)\right]^3} \quad (9)$$

$$\rho_{ag} = \frac{M}{LA_g} = \frac{M}{L\left(1 - \frac{1}{\pi}\left(\beta - \frac{1}{2}\sin 2\beta\right)A\right)} \quad (10)$$

$$\frac{dp}{dx} = \frac{\tau_i S_i}{\varphi A} \quad (11)$$

$$\Delta p = \frac{\tau_i S_i}{\varphi A}L \quad (12)$$

$$\Delta p - \Delta p' = P_t - P_t \quad (13)$$

$$\frac{0.0142\rho_{ag}Q^2 DL\sin\beta}{2\left[\frac{1}{\pi}\left(\beta - \frac{1}{2}\sin 2\beta\right)\right]^2\left[1 - \frac{1}{\pi}\left(\beta - \frac{1}{2}\sin 2\beta\right)\right]A^3} - Lp_{li} = P_t - P_t \quad (14)$$

$$P_{ag} = RT\rho_{ag} \quad (15)$$

$$P_{ag} = \frac{P_s + (P_s + \Delta p)}{2} \quad (16)$$

$$P_s = P_{ag} - \frac{0.0142\rho_{ag}Q^2 D\sin\beta L}{4\left[\frac{1}{\pi}\left(\beta - \frac{1}{2}\sin 2\beta\right)\right]^2\left[1 - \frac{1}{\pi}\left(\beta - \frac{1}{2}\sin 2\beta\right)\right]A^3} \quad (17)$$

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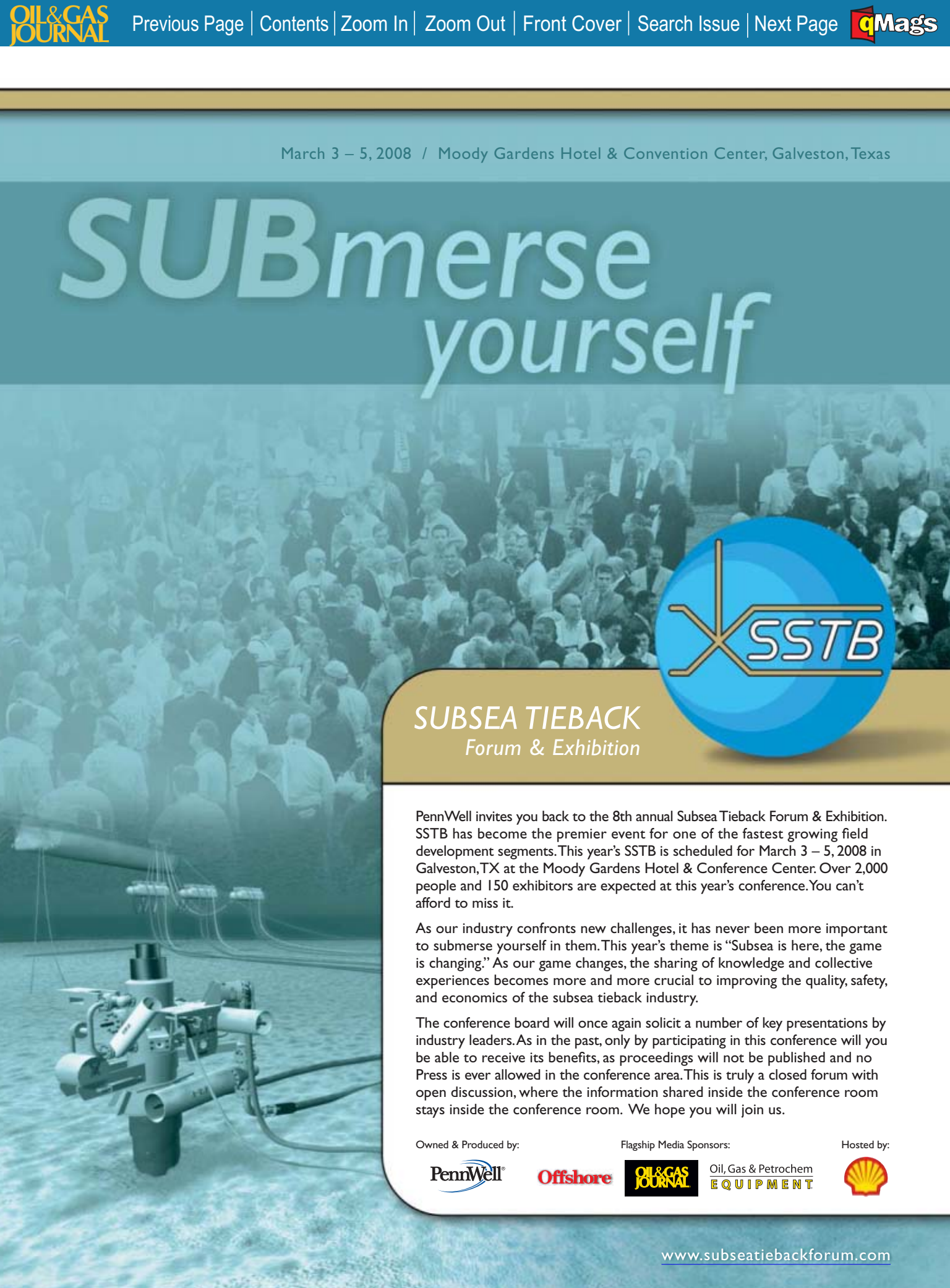

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SEGMENT DIMENSIONS

Table 1

Segment	Length, km	Drop height, m
A	83	1,000
B	131	537
C	240	455
D	113	1,030
E	138	1,283

lows full preparation of the pipeline and the air exhaust process is safe because it is evacuated with the water. The procedure, however, is time-consuming and requires large quantities of nearby water.

Western China, especially Xinjiang and Gansu provinces, suffers from a serious water shortage. CWPP therefore used a different commissioning technique, filling only part of the pipeline (about 650 km) with water and then pumping oil products into the pipeline to displace the water. CWPP's long slope characteristics, however, led to air exhaust problems as a result of this process.

Pipeline air exhaust in China usually occurs as static pipeline air exhaust. Before performing the air exhaust procedure the whole pipeline is shutdown so that the air in the pipe can accumulate at the relatively high points in pipeline. Frequent shutdowns of the CWPP, however, could cause the oil portion of the linefill to mix rapidly with the air, making subsequent air exhaust dangerous. Air must therefore be removed from the water segment without pipeline shutdown, requiring the air location and length in the pipe be judged more accurately, and not just by observation.

The following analysis and equations will help determine the location and length of intake air in the pipe, making air exhaust more accurate and efficient.

Analysis

In downward-inclined pipeline segments, the flow pattern looks slack during water filling after the head of water overtops the peak of segments. Water arriving at the bottom of the pipe segments generates a liquid, sealing a certain amount of air in the segments (Fig. 3). Air sealed in this manner represents the majority of the air captured during commissioning. A generated equation can evaluate the volume of the air sealed in the downward inclined segments.

Along the whole CWPP are five segments with large drops; A, B, C, D, and E (Fig. 2). Table 1 shows the length and drop of each segment. During the commissioning process the operator should pay particular attention to segments A, D, and E, which have short lengths and large drop heights, capturing a larger amount of air than the other segments.

The height difference and gravity usually cause the downstream pressure of a downward inclined pipe segment to be higher than the upstream pressure, making the two-phase flow in the downward inclined segment much different from the two-phase flow in horizontal or upward inclined segments. Flow patterns depend on pipe inclination angles, liquid velocities, and pressures.

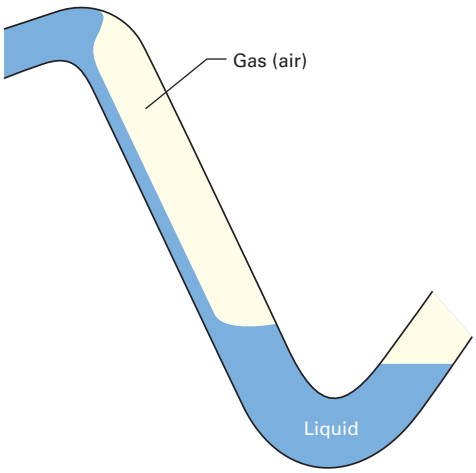
Three flow patterns typically emerge during low air velocity pipeline commissioning (Fig. 4). After being sealed in the downward inclined segment air often accumulates, forming an elongated bubble with the pressure increasing in the segment. Certain pressures and liquid velocities can create an equilibrium of forces at each point of the elongated bubble, causing the bubble to become stationary inside the segment (Fig. 4a).

If the liquid velocity increases, the elongated bubble will begin to move at a velocity determined by the interfacial friction between the water and air (Fig. 4b). A sufficiently high liquid and air velocity will cause the flow pattern in the pipe to change, creating a slug flow or dispersed bubble flow in the segment (Fig. 4c).

Safety considerations require restricting the commissioning flow rate to low

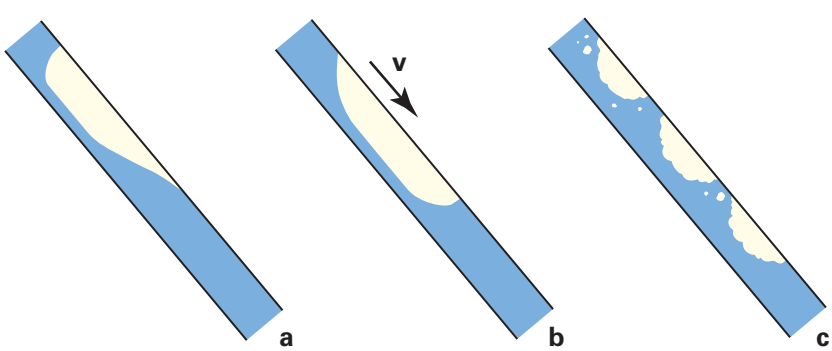
AIR-INTAKE GEOMETRY

Fig. 3



FLOW-PATTERN GEOMETRY LOW AIR VELOCITY

Fig. 4



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values. CWPP's liquid velocity measured <1 m/sec. Taitel, Sarica, and Brill recommended a flow pattern map based on Barnea's model for a water-air system with a 5-cm OD and −1° inclination angle (Fig. 5).[1,2]

It shows the low flow rates and small downward inclination angles cause the flow pattern to tend to laminar, with other flow patterns—slug flow, dispersed bubble flow, annular flow—seldom occurring. The calculation in this article therefore aims at laminar flow; calculating the location of air and length of air mass in a laminar state and ignoring other potential flow patterns.

Calculations

Fig. 6 shows the parameters of the pipe cross section. Certain geometric relations exist among these parameters. β is the semicenter angle of liquid. D is the pipe's diameter. S_G is the air phase wetted perimeter, defined as $S_G = D(\pi-\beta)$. S_L is the liquid phase wetted perimeter, defined as $S_L = D\beta$. S_i is the interface perimeter, defined as $S_i = D\sin\beta$. Equation 1 calculates the void fraction, φ.

Nicholas[3] presented the correlation derived from the Manning Formula, in which f is the liquid friction factor of slack region, f_0 is the liquid friction factor of tight line flow, z is height, x is mileage, and v_0 is the velocity of tight line flow (Equation 2). The numerator on the right hand is the elevation gradient in the slack region, equal to the head gradient in the slack region. The denominator of the right hand side is the tight line head gradient.

Since the friction factor does not change rapidly with velocity for most pipeline flow rates, $f/f_0 = 1$. According to Equation 2, β is only correlated to the pipe downward inclination angle, θ, and tight line flow velocity, v_0.

Flow pattern; 5-cm OD, −1° incline

Fig. 5

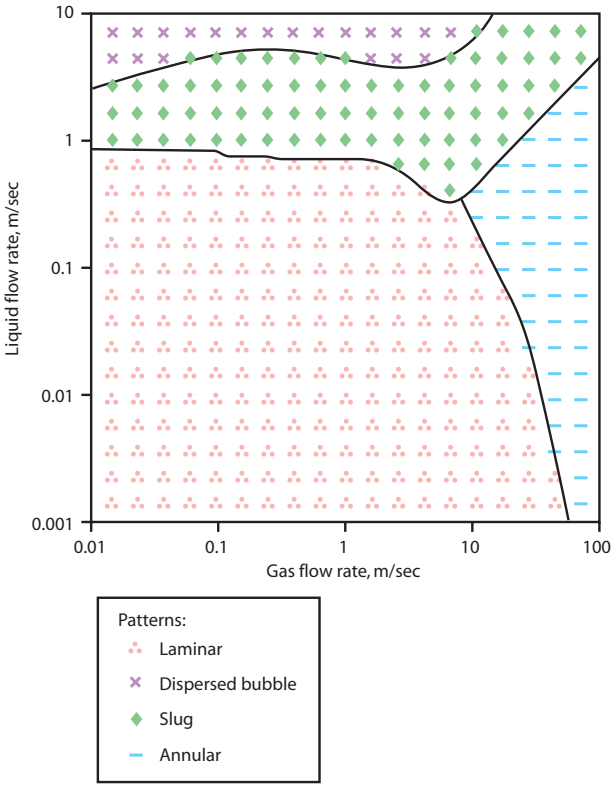


Fig. 7 shows the correlation characteristic among them. Equation 3 calculates the value of air mass sealed in the pipe, in which M is the value of air mass, ρ_0 is the air density at atmospheric pressure, L_0 is the length of downward inclined segment, and A is the area of pipe cross section.

Air length

Precalculation assumptions for the two-phase flow segments include uniform air density and void fraction at each point along the segments. Taitel presented equilibrium equations for both liquid and air phase (Equations 4 and 5),[4] where shear stresses τ_g, τ_i, and τ_l can be expressed as Equation 6.

In these equations g is acceleration of gravity, ρ is density, p is pressure, and v is velocity. Subscripts g, l, and i refer to the air, liquid, and interface, respectively. A constant value, $f_i = 0.0142$, provides the interfacial air-liquid shear stress, τ_i.[5] Equation 7 approximates liquid shear stress's, τ_l, friction factor, f_l. The Colebrook-White Formula recommended by Xiao[6] can calculate turbulent flow's f_l.

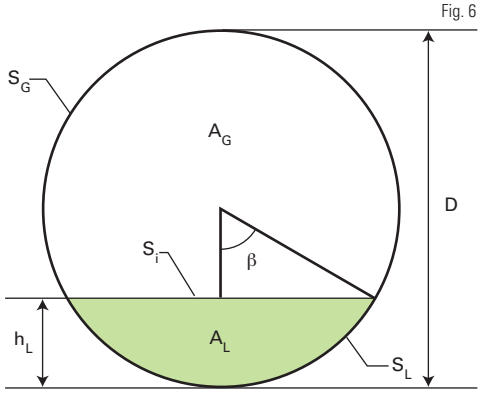
Where e is the absolute surface roughness of the pipe inner wall, $Re_l = \rho_l v_l D_l/\mu_l$, with $D_l = 4A_l/s_l$, and μ_l as liquid dynamic viscosity, can define liquid Reynolds Number Re_l. The tiny air velocity causes air shear stress, τ_i, to tend to zero.

Equation 4 allows both the shear stress and the gravity force of air to be neglected because of their tiny values. Equation 8 can therefore express Equations 4 and 5. Substituting Equations 1, 6, and 7 into Equation 8 yields

Pipe cross-section geometry

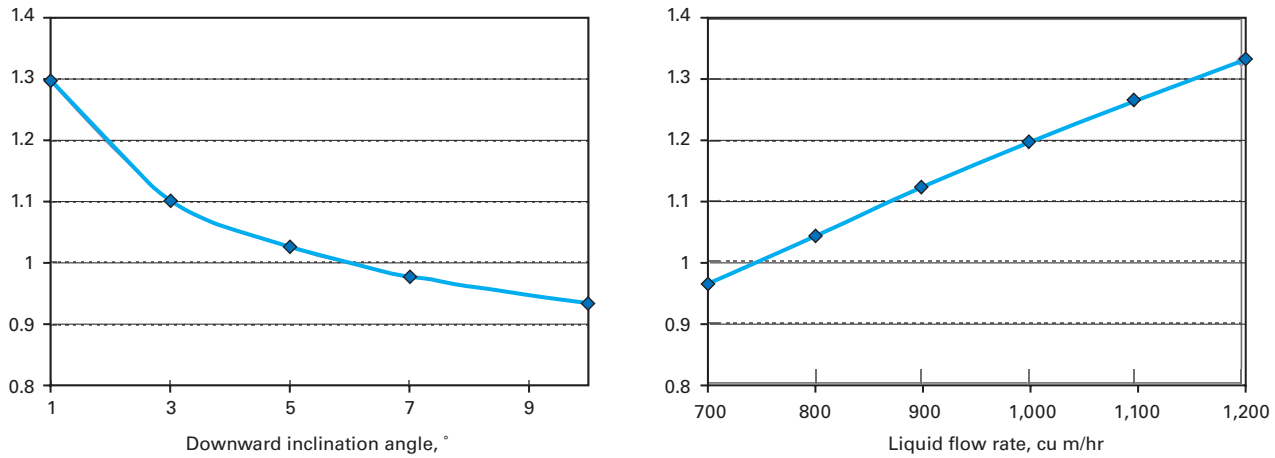
Fig. 6

β = semicenter angle of liquid
D = pipe diameter
A_G = air phase
A_L = liquid phase
h_L = liquid depth
S_G = air phase wetted perimeter
S_L = liquid phase wetted perimeter
S_i = air-liquid interface



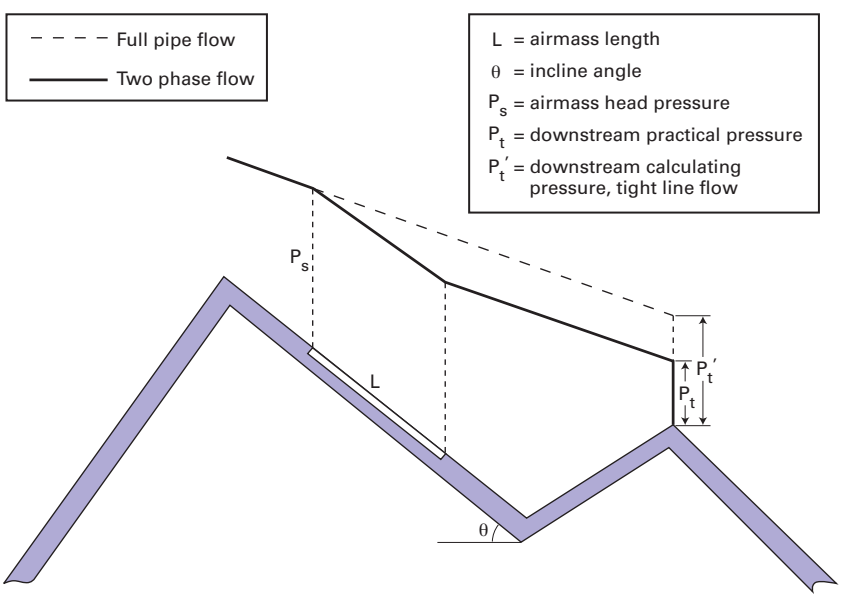
CORRELATION; SEMICENTER ANGLE (β), Θ/Q

Fig. 7



PRESSURE DROP GEOMETRY

Fig. 8



Equation 9, where ρ_{ag} is the air average density calculated by Equation 10.

Two unknown quantities exist in Equations 9 and 10: air length, L, and semicenter angle, β. One more equation will close the equations, making them solvable. Equation 11 is a simplification of Equation 4. Integrating Equation 11 yields a linear pressure drop expression, Equation 12, where Δp is the pressure drop at the two-phase flow region. The air mass in pipe creates a different pressure drop from that seen in tight line flow (Fig. 8).

Equation 13 closes the equations, where Δp' is the pressure drop on tight line flow condition, P_t' is the calculating pressure of downstream on tight line flow condition, and P_t is the practical pressure of downstream. Substituting Equations 1, 6, and 7 into Equation 13 yields Equation 14, in which p_{li} is the pressure drop per unit pipe length. Combining Equations 9 and 14 solves the unknown quantities L and β, while Equation 1 calculates the void fraction.

Air location

Figuring the air mass length and void fraction lets Equation 10 calculate the air mass average density, ρ_{ag}. Equation 15, the state of gas equation, in which T is absolute temperature and R is the gas constant, yields the air mass average pressure, P_{ag}. Fig. 8 shows discovering the pressure of the air mass head, P_s, can directly disclose the location of the air mass. Equation 16 shows the correlation between P_{ag} and P_s.

Substituting Equations 6 and 12 into Equation 16 yields Equation 17.

Fig. 8 shows the uniqueness of the pressure at each point on a downward inclined segment. The point of air mass head occurs at the two-phase flow, and the pressure before this point can be calculated as a tight line flow condition. Obtaining the pressure of the air mass head yields the location of the air mass by comparing it with the pressure of a tight line flow condition.

Results

CWPP segments D and E (Fig. 2) are the high air-intake occurrence areas. Practical data analysis and staff reports show active air intake in the two segments. Table 2 shows the operating data of segments D and E. Table 3 shows the

Operating data, segments D and E

Table 2

Parameters	D value	E value
Length, km	113.3	97
Height change, m	1,029.5	1,058
Diameter, mm	544	493
Input pressure, MPa	0.53	0.11
Average flow rate, cu m/hr	930	1,000
Input pressure at downstream pump station, MPa	5.33	8.3
Input pressure at downstream pump station, tight line flow, MPa	6.14	9.4

Calculation results, sections D and E

Table 3

Results	D value	E value
Air mass quantity, kg	20,271	15,339
β, semicenter angle of liquid, °	1.5702	1.4621
Void fraction, %	45	56
Air, average density, kg/cu m	12.1	16.0
Air, average pressure, MPa	1.02	1.35
Air mass length, km	60.7	46.2
Distance from air mass head to peak point, km	8	4

results of subsequent calculation.

The two segment calculations show the air mass sealed in the pipe depends on pipe diameter, liquid flow rate, downward inclined pipe length, and inclination angle. Increasing pressure compressed the length of air by about 50% and also led to changes to the void fraction, which balanced the pressure difference from interfacial friction. The results confirm the air will not stagnate at the peak but will at certain other determinable points during normal transport conditions. ✦

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The fourth DryTree & Riser Forum will be held in Houston, Texas this year at the OMNI Hotel on November 28, 2007. This year's theme, "Deeper Water - Practical Solutions," will present practical experiences relating to choices when choosing drytree production systems and deepwater riser systems. During this one-day forum, speakers and delegates will explore the technology, tools, decision-making processes, and functional requirements of the concept selection and execution employing drytrees and various riser systems.

Additionally, the first six presentations are made available through a live webcast from the conference floor and participants will be able to attend and ask pertinent questions and share insight during the first half of the conference. The final six presentations are closed to press to ensure that the extremely topical discussions and timely nature of the conference material is maintained.

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7:00 - 8:00 am	Registration & Continental Breakfast
8:00 – 8:15 am	Welcome & Opening Remarks
8:15 – 9:45 am	Session 1 & Live Webcast
9:45 – 10:00 am	Coffee Break
10:00 – 11:30 am	Session 2 & Live Webcast
11:30 – 12:30 pm	Lunch
12:30 – 2:00 pm	Session 3 (closed session)
2:00 – 2:15 pm	Coffee Break
2:15 – 3:45 pm	Session 4 (closed session)
3:45 – 4:00 pm	Closing Remarks
4:00 – 5:00 pm	Networking Reception

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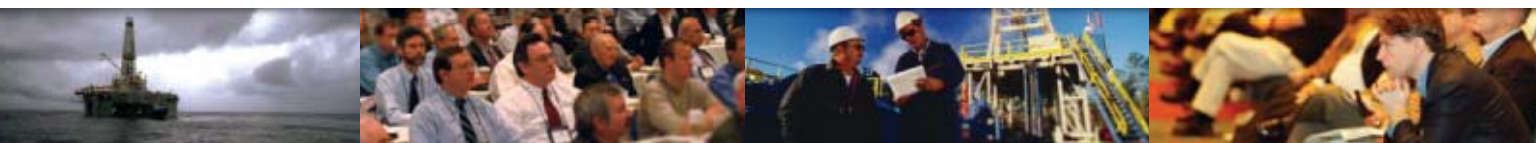


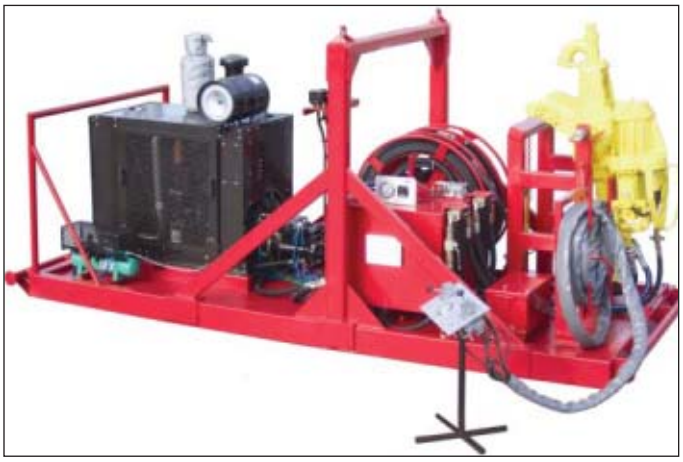
Equipment/Software/Literature

New 120-ton power swivel for fishing, workovers

This new hydraulic, motor-driven, 120-ton power swivel with offshore package promises smooth, accurately controlled, shock-free rotary power that is suited for fishing and workover operations.

It handles internal or external cutting of tubing, casing, or drill pipe; drilling out plugs, packers, or cement; milling operations; or scraping casing—whenever shock-free, controlled torque is essential to eliminating the potential danger of twist-offs or damage to cutting tools, the firm points out.

In addition to oil and gas wells, it is also suited for light to medium drilling applications including water wells and pilings for piers and foundations. Suspending the swivel from a boom or crane eliminates a great deal of setup time or shifts to additional locations. The swivel is also can be used for coring operations. Any length of core may be taken. Accurate, smooth torque ensures against damage to core tools or strings, the firm says.



The skid-mounted unit is made of heavy-duty structural tubing with welded construction. To meet increased environmental safety regulations, it is equipped with a containment lip to eliminate fluid spills. Both ends are rounded for easy skidding. The lifting frame may be used to attach boom lines or hoist slings. The lifting frame is flush with the sides of the skid. Main runners, running the length of the skid, are strengthened by cross-members for additional rigidity. The frame is covered with a polyurea coating for corrosion resistance and has a diamond-patterned deck plate to provide a solid, skid resistant floor.

The swivel incorporates improvements such as interchangeable parts in key areas for economy and easy service. The compact, lightweight swivel-head design weighs 2,000 lb and fits a variety of drilling or workover masts. The design incorporates a reliable, custom-built drive train with hardened steel gears.

Source: **Logan Oil Tools Inc.,** 11006 Lucerne St., Houston, TX 77016.

Services/Suppliers

Baker, Donelson, Bearman, Caldwell & Berkowitz PC

Washington, DC, has announced that Scott L. Campbell has joined the firm's headquarters office. Campbell is an internationally recognized energy policy consultant and counter-terrorism advisor. He served as director of the office of policy, planning and analysis at the US Department of Energy under President Ronald Reagan, and served on the National Petroleum Council, advising the Secretary of Energy, under President George H.W. Bush.

Prior to joining government, Campbell was president of a Dallas-based oil and gas consulting firm, served as executive vice-president of a Texas independent oil and gas company, practiced law in Texas, and served as a federal prosecutor.

The Federal Public Policy Group of Baker, Donelson, Bearman, Caldwell & Berkowitz PC was founded in 1988. The firm has grown to include more than 500 attorneys and public policy and international advisors.

CTC Marine Projects Ltd.

Darlington, UK, has named Donald MacPherson as operations manager within its recently formed submarine telecommunications group. MacPherson, who will be based in CTC's London office, joins the company from Alcatel-Lucent.

CTC Marine Projects Ltd., a DeepOcean ASA subsidiary, is a leading marine trenching and installation contractor, operating in the subsea oil and gas, telecommunications, military, and utilities sectors of the offshore construction industry. Its major markets are the North Sea and Asia.

DeepOcean ASA is a subsea service provider headquartered in Haugesund, Norway.

Genoil Inc.

Calgary, has announced the appointment of Richard D. Chimblo to manager, global business development, and Mohammed H. Al-Saif to manager, Middle East operations.

Chimblo has over 38 years of petroleum industry experience, including 16 years with Saudi Aramco. He has managed professional geoscientists at major oil and gas companies in the US, England, and Saudi Arabia. At Genoil, Chimblo will be responsible for developing business for the company's GHU heavy oil upgrading technology.

Al-Saif was with Saudi Aramco for 25 years, with specialization in seismic acquisition, data processing, and cartography.

Genoil Inc. is an international engineering technology development company providing innovative hydrocarbon, oil, and water separation and marine technologies.

Van Leeuwen Pipe and Tube Group

Zwijndrecht, The Netherlands, has appointed Peter Rietberg as chairman of the board.

Van Leeuwen Pipe and Tube Group is an international trading company specializing in steel pipes, pipe components, and valves. The group has branches throughout Europe, Asia, the Middle East, Australia, and North America.

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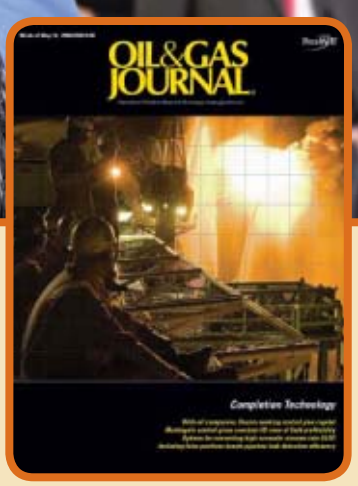

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[1] *Signet Readership Survey (February 2007)*

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Imports of crude and products

	Districts 1-4 10-5 2007	Districts 1-4 9-28 2007	District 5 10-5 2007	District 5 9-28 2007	Total US 10-5 2007	Total US 9-28 2007	Total US *10-6 2006
	1,000 b/d						
Total motor gasoline	1,301	1,032	22	122	1,323	1,154	1,070
Mo. gas. blending comp.	675	608	22	28	697	636	563
Distillate	385	192	—	—	385	192	268
Residual	307	335	—	—	307	335	197
Jet fuel-kerosine	169	85	77	27	246	112	215
Propane-propylene	154	159	1	6	155	165	226
Other	528	639	53	32	581	671	481
Total products	**3,519**	**3,050**	**175**	**215**	**3,694**	**3,265**	**3,020**
Total crude	**8,849**	**8,905**	**1,020**	**1,348**	**9,869**	**10,253**	**10,364**
Total imports	**12,368**	**11,955**	**1,195**	**1,563**	**13,563**	**13,518**	**13,384**

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

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

OIL&GAS JOURNAL online research center

OGJ crack spread

	*10-12-07	*10-13-06	Change	Change, %
	$/bbl			
SPOT PRICES				
Product value	89.70	65.35	24.36	37.3
Brent crude	79.20	57.81	21.39	37.0
Crack spread	10.50	7.53	2.97	39.4
FUTURES MARKET PRICES				
One month				
Product value	88.58	66.28	22.31	33.7
Light sweet crude	81.47	58.50	22.97	39.3
Crack spread	7.11	7.78	–0.66	–8.5
Six month				
Product value	92.83	76.94	15.89	20.7
Light sweet crude	78.46	64.60	13.86	21.4
Crack spread	14.38	12.34	2.04	16.5

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

Purvin & Gertz LNG netbacks—Oct. 12, 2007

Receiving terminal	Liquefaction plant: Algeria	Malaysia	Nigeria	Austr. NW Shelf	Qatar	Trinidad
	$/MMbtu					
Barcelona	6.63	4.63	5.81	4.53	5.23	5.78
Everett	5.72	3.59	5.32	3.67	4.17	6.02
Isle of Grain	7.53	5.32	6.87	5.21	5.93	6.94
Lake Charles	4.51	2.56	4.25	2.73	3.00	5.14
Sodegaura	5.45	7.32	5.65	7.34	6.65	4.89
Zeebrugge	6.41	4.31	5.80	4.20	4.89	5.83

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

Crude and product stocks

District	Crude oil	Motor gasoline: Total	Motor gasoline: Blending comp.[1]	Jet fuel, kerosine	Fuel oils: Distillate	Fuel oils: Residual	Propane-propylene
	1,000 bbl						
PADD 1	15,728	50,177	23,129	10,933	59,360	14,474	4,660
PADD 2	62,728	47,864	16,049	7,107	28,875	1,327	23,562
PADD 3	174,715	60,746	26,329	12,650	32,549	15,110	29,128
PADD 4	14,039	5,826	1,696	520	2,480	325	[1]2,928
PADD 5	52,871	28,387	20,372	10,143	12,060	5,330	—
Oct. 5, 2007	**320,081**	**193,000**	**87,575**	**41,353**	**135,324**	**36,566**	**60,278**
Sept. 28, 2007	**321,755**	**191,325**	**87,516**	**40,846**	**135,887**	**37,408**	**59,105**
Oct. 6, 2006[2]	**330,530**	**215,397**	**96,664**	**42,192**	**149,946**	**42,879**	**70,807**

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

Refinery report—Oct. 5, 2007

District	Refinery operations: Gross inputs	Refinery operations: Crude oil inputs	Refinery output: Total motor gasoline	Refinery output: Jet fuel, kerosine	Refinery output: Fuel oils: Distillate	Refinery output: Fuel oils: Residual	Refinery output: Propane-propylene
	1,000 b/d						
PADD 1	1,599	1,615	1,850	77	496	154	70
PADD 2	3,082	3,057	2,000	203	890	65	162
PADD 3	7,478	7,332	3,238	676	2,038	271	732
PADD 4	561	556	263	23	190	12	[1]140
PADD 5	2,606	2,551	1,581	412	557	142	—
Oct. 5, 2007	**15,326**	**15,111**	**8,932**	**1,391**	**4,171**	**644**	**1,104**
Sept. 28, 2007	**15,268**	**15,154**	**8,698**	**1,341**	**4,074**	**698**	**1,035**
Oct. 6, 2006[2]	**15,513**	**15,296**	**8,878**	**1,479**	**3,984**	**592**	**1,015**
	17,448 operable capacity		**87.8% utilization rate**				

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

OGJ GASOLINE PRICES

	Price ex tax 10-10-07	Pump price* 10-10-07	Pump price 10-11-06
		¢/gal	
(Approx. prices for self-service unleaded gasoline)			
Atlanta	240.9	280.6	209.5
Baltimore	225.0	266.9	217.5
Boston	222.0	263.9	228.3
Buffalo	219.8	279.9	234.0
Miami	249.5	299.8	232.6
Newark	228.0	260.9	228.4
New York	218.8	278.9	242.4
Norfolk	224.3	261.9	214.3
Philadelphia	225.2	275.9	233.5
Pittsburgh	225.2	275.9	232.0
Wash., DC	240.5	278.9	236.7
PAD I avg.	229.0	274.9	228.1
Chicago	242.0	292.9	241.7
Cleveland	230.2	276.6	213.2
Des Moines	229.9	270.3	202.2
Detroit	238.9	288.1	224.2
Indianapolis	241.6	286.6	214.2
Kansas City	238.6	274.6	210.2
Louisville	249.8	286.7	207.2
Memphis	216.6	256.4	220.0
Milwaukee	244.2	295.5	228.2
Minn.-St. Paul	249.0	289.4	220.2
Oklahoma City	230.9	266.3	208.2
Omaha	223.5	269.9	220.1
St. Louis	225.2	261.2	216.7
Tulsa	227.1	262.5	205.3
Wichita	221.5	264.9	213.2
PAD II avg.	233.9	276.1	216.3
Albuquerque	236.8	273.2	221.9
Birmingham	223.6	262.3	211.3
Dallas-Fort Worth	222.9	261.3	206.3
Houston	228.0	266.4	210.3
Little Rock	222.2	262.4	214.3
New Orleans	229.9	268.3	225.6
San Antonio	225.7	264.1	222.2
PAD III avg.	227.0	265.5	216.0
Cheyenne	246.5	278.9	246.5
Denver	245.5	285.9	252.2
Salt Lake City	238.1	281.0	257.7
PAD IV avg.	243.4	282.0	252.1
Los Angeles	227.1	285.6	261.2
Phoenix	258.1	295.5	243.1
Portland	251.2	294.5	261.2
San Diego	239.0	297.5	265.2
San Francisco	235.0	293.5	276.3
Seattle	238.1	290.5	271.2
PAD V avg.	241.4	292.9	263.0
Week's avg.	**233.3**	**276.8**	**228.6**
Sept. avg.	**236.3**	**280.4**	**253.3**
Aug. avg.	**237.2**	**280.8**	**296.7**
2007 to date	**229.7**	**273.3**	—
2006 to date	**220.3**	**263.9**	—

*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

	10-5-07 ¢/gal		10-5-07 ¢/gal
Spot market product prices			
Motor gasoline (Conventional-regular)		Heating oil No. 2	
New York Harbor	211.24	New York Harbor	219.32
Gulf Coast	207.24	Gulf Coast	217.57
Los Angeles	230.24	Gas oil	
Amsterdam-Rotterdam-Antwerp (ARA)	188.66	ARA	221.37
Singapore	200.50	Singapore	219.52
Motor gasoline (Reformulated-regular)		Residual fuel oil	
New York Harbor	206.24	New York Harbor	138.57
Gulf Coast	203.49	Gulf Coast	147.62
Los Angeles	231.24	Los Angeles	156.42
		ARA	148.13
		Singapore	152.45

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

BAKER HUGHES RIG COUNT

	10-12-07	10-13-06
Alabama	6	5
Alaska	5	6
Arkansas	48	26
California	41	33
Land	40	30
Offshore	1	3
Colorado	111	90
Florida	0	0
Illinois	0	0
Indiana	2	0
Kansas	14	9
Kentucky	11	13
Louisiana	146	194
N. Land	56	57
S. Inland waters	25	18
S. Land	27	43
Offshore	38	76
Maryland	1	1
Michigan	1	1
Mississippi	12	11
Montana	13	17
Nebraska	1	0
New Mexico	66	88
New York	6	8
North Dakota	46	35
Ohio	14	9
Oklahoma	200	178
Pennsylvania	18	15
South Dakota	1	1
Texas	847	799
Offshore	6	14
Inland waters	1	6
Dist. 1	27	20
Dist. 2	29	28
Dist. 3	59	53
Dist. 4	79	97
Dist. 5	178	134
Dist. 6	128	120
Dist. 7B	41	45
Dist. 7C	58	40
Dist. 8	124	96
Dist. 8A	20	27
Dist. 9	36	44
Dist. 10	61	75
Utah	45	45
West Virginia	31	30
Wyoming	70	107
Others—NV-3; TN-5; VA-3	11	7
Total US	**1,767**	**1,728**
Total Canada	**343**	**477**
Grand total	**2,110**	**2,205**
Oil rigs	319	284
Gas rigs	1,442	1,439
Total offshore	46	94
Total cum. avg. YTD	**1,760**	**1,631**

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	10-12-07 Percent footage*	Rig count	10-13-06 Percent footage*
0-2,500	59	5.0	52	—
2,501-5,000	104	57.6	93	47.3
5,001-7,500	226	21.6	244	18.4
7,501-10,000	438	3.1	402	3.4
10,001-12,500	432	1.6	415	2.1
12,501-15,000	280	0.3	268	0.3
15,001-17,500	113	—	119	—
17,501-20,000	66	—	71	—
20,001-over	34	—	35	—
Total	**1,752**	**7.6**	**1,699**	**6.6**
INLAND	39		41	
LAND	1,667		1,593	
OFFSHORE	46		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]10-12-07	[2]10-13-06
	1,000 b/d	
(Crude oil and lease condensate)		
Alabama	15	20
Alaska	750	685
California	663	681
Colorado	50	62
Florida	6	7
Illinois	30	28
Kansas	94	98
Louisiana	1,308	1,384
Michigan	14	14
Mississippi	49	47
Montana	91	93
New Mexico	167	150
North Dakota	108	115
Oklahoma	166	172
Texas	1,318	1,348
Utah	44	48
Wyoming	142	141
All others	59	70
Total	**5,074**	**5,163**

[1]OGJ estimate. [2]Revised.

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

US CRUDE PRICES

$/bbl*	10-12-07
Alaska-North Slope 27°	67.75
South Louisiana Sweet	83.75
California-Kern River 13°	72.40
Lost Hills 30°	80.35
Southwest Wyoming Sweet	75.69
East Texas Sweet	79.75
West Texas Sour 34°	74.50
West Texas Intermediate	80.25
Oklahoma Sweet	80.25
Texas Upper Gulf Coast	76.75
Michigan Sour	73.25
Kansas Common	79.25
North Dakota Sweet	70.75

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

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

WORLD CRUDE PRICES

$/bbl[1]	10-5-07
United Kingdom-Brent 38°	78.07
Russia-Urals 32°	74.96
Saudi Light 34°	75.56
Dubai Fateh 32°	74.00
Algeria Saharan 44°	79.80
Nigeria-Bonny Light 37°	80.44
Indonesia-Minas 34°	80.95
Venezuela-Tia Juana Light 31°	74.57
Mexico-Isthmus 33°	74.46
OPEC basket	69.46
Total OPEC[2]	76.18
Total non-OPEC[2]	74.85
Total world[2]	75.57
US imports[3]	73.65

[1]Estimated contract prices. [2]Average price (FOB) weighted by estimated export volume. [3]Average price (FOB) weighted by estimated import volume. NOTE: No new data at presstime.

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

US NATURAL GAS STORAGE[1]

	10-5-07	9-28-07	Change
		bcf	
Producing region	988	965	23
Consuming region east	1,907	1,864	43
Consuming region west	441	434	7
Total US	**3,336**	**3,263**	**73**
	July 07	**July 06**	**Change, %**
Total US[2]	**2,894**	**2,779**	**4.1**

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

Statistics

WORLD OIL BALANCE

	2007 2nd qtr.	2007 1st qtr.	2006 4th qtr.	2006 3rd qtr.	2006 2nd qtr.	2006 1st qtr.
	Million b/d					
DEMAND						
OECD						
US & Territories	20.97	21.07	21.01	21.14	20.87	20.75
Canada	2.33	2.34	2.26	2.26	2.17	2.26
Mexico	2.07	2.05	2.00	1.96	1.98	2.05
Japan	4.61	5.39	5.29	4.75	4.72	5.89
South Korea	2.12	2.35	2.32	2.04	2.04	2.29
France	1.85	1.97	1.95	1.93	1.87	2.09
Italy	1.67	1.69	1.71	1.68	1.65	1.89
United Kingdom	1.78	1.80	1.81	1.78	1.82	1.91
Germany	2.42	2.42	2.71	2.75	2.59	2.60
Other OECD Europe	7.22	7.37	7.46	7.43	7.21	7.40
Australia & New Zealand	1.07	1.09	1.10	1.07	1.06	1.06
Total OECD	**48.11**	**49.54**	**49.62**	**48.79**	**47.98**	**50.19**
NON-OECD						
China	7.62	7.43	7.53	7.24	7.30	7.02
FSU	4.30	4.43	4.38	4.18	4.20	4.35
Non-OECD Europe	0.70	0.75	0.71	0.66	0.71	0.75
Other Asia	8.71	8.62	8.71	8.43	8.60	8.51
Other non-OECD	14.95	14.69	14.52	14.75	14.48	14.27
Total non-OECD	**36.28**	**35.92**	**35.85**	**35.26**	**35.29**	**34.90**
TOTAL DEMAND	**84.39**	**85.46**	**85.47**	**84.05**	**83.27**	**85.09**
SUPPLY						
OECD						
US	8.53	8.43	8.40	8.38	8.34	8.20
Canada	3.33	3.42	3.39	3.31	3.16	3.29
Mexico	3.61	3.59	3.52	3.71	3.79	3.81
North Sea	4.48	4.80	4.76	4.51	4.71	5.11
Other OECD	1.54	1.50	1.55	1.55	1.44	1.43
Total OECD	**21.49**	**21.74**	**21.62**	**21.46**	**21.44**	**21.84**
NON-OECD						
FSU	12.60	12.61	12.48	12.26	12.07	11.81
China	3.96	3.87	3.86	3.85	3.87	3.85
Other non-OECD	11.83	11.43	11.71	11.90	11.70	11.52
Total non-OECD, non-OPEC	**28.39**	**27.91**	**28.05**	**28.01**	**27.64**	**27.18**
OPEC*	**34.58**	**34.51**	**34.97**	**35.66**	**35.19**	**35.36**
TOTAL SUPPLY	**84.46**	**84.16**	**84.64**	**86.13**	**84.27**	**84.38**
Stock change	**0.07**	**–1.30**	**–0.83**	**1.08**	**1.00**	**–0.71**

*Includes Angola.
Source: DOE International Petroleum Monthly
Data available in OGJ Online Research Center.

OECD TOTAL NET OIL IMPORTS

	June 2007	May 2007	Apr. 2007	June 2006	Chg. vs. previous year Volume	Chg. vs. previous year %
	Million b/d					
Canada	–1,038	–1,234	–1,384	–1,001	–37	3.7
US	12,180	12,784	12,583	12,801	–621	–4.9
Mexico	–1,501	–1,560	–1,497	–1,784	283	–15.9
France	1,670	1,657	2,284	1,705	–35	–2.1
Germany	2,085	1,999	2,028	2,465	–380	–15.4
Italy	1,668	1,468	1,635	1,524	144	9.4
Netherlands	903	1,157	992	1,156	–253	–21.9
Spain	1,476	1,566	1,662	1,526	–50	–3.3
Other importers	3,801	3,867	3,557	3,916	–115	–2.9
Norway	–1,962	–2,440	–2,275	–2,747	785	–28.6
United Kingdom	–206	155	–206	–79	–127	160.8
Total OECD Europe	**9,435**	**9,429**	**9,677**	**9,466**	**–31**	**–0.3**
Japan	4,876	4,331	4,802	4,437	439	9.9
South Korea	2,125	2,444	1,875	2,107	18	0.9
Other OECD	948	993	742	1,104	–156	–14.1
Total OECD	**27,025**	**27,187**	**26,798**	**27,130**	**–105**	**–0.4**

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

OECD* TOTAL GROSS IMPORTS FROM OPEC

	June 2007	May 2007	Apr. 2007	June 2006	Chg. vs. previous year Volume	Chg. vs. previous year %
	Million b/d					
Canada	435	433	403	435	—	—
US	6,119	6,187	5,977	6,214	–95	–1.5
Mexico	21	20	21	5	16	320.0
France	786	779	821	947	–161	–17.0
Germany	499	397	467	522	–23	–4.4
Italy	1,265	1,114	1,187	1,246	19	1.5
Netherlands	491	513	679	652	–161	–24.7
Spain	770	721	637	807	–37	–4.6
Other importers	1,094	1,295	1,298	1,469	–375	–25.5
United Kingdom	247	221	264	253	–6	–2.4
Total OECD Europe	**5,152**	**5,040**	**5,353**	**5,896**	**–744**	**–12.6**
Japan	4,023	3,774	4,024	4,029	–6	–0.1
South Korea	2,364	2,441	2,136	2,273	91	4.0
Other OECD	736	670	741	711	25	3.5
Total OECD	**18,850**	**18,565**	**18,655**	**19,563**	**–713**	**–3.6**

*Organization for Economic Cooperation and Development.
Source: DOE International Petroleum Monthly
Data available in OGJ Online Research Center.

US PETROLEUM IMPORTS FROM SOURCE COUNTRY

	June 2007	May 2007	Average YTD 2007	Average YTD 2006	Chg. vs. previous year Volume	Chg. vs. previous year %
	1,000 b/d					
Algeria	709	744	721	583	138	23.7
Angola	514	692	582	467	115	24.6
Kuwait	263	168	202	167	35	21.0
Nigeria	968	964	1,078	1,188	–110	–9.3
Saudi Arabia	1,534	1,614	1,445	1,464	–19	–1.3
Venezuela	1,364	1,520	1,356	1,453	–97	–6.7
Other OPEC	767	485	629	181	448	247.5
Total OPEC	**6,119**	**6,187**	**6,013**	**5,503**	**510**	**9.3**
Canada	2,375	2,462	2,423	2,273	150	6.6
Mexico	1,529	1,617	1,592	1,797	–205	–11.4
Norway	183	234	170	193	–23	–11.9
United Kingdom	345	390	313	286	27	9.4
Virgin Islands	218	287	319	297	22	7.4
Other non-OPEC	2,732	2,987	2,732	3,239	–507	–15.7
Total non-OPEC	**7,382**	**7,977**	**7,549**	**8,085**	**–536**	**–6.6**
TOTAL IMPORTS	**13,501**	**14,164**	**13,562**	**13,588**	**–26**	**–0.2**

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

OIL STOCKS IN OECD COUNTRIES*

	June 2007	May 2007	Apr. 2007	June 2006	Chg. vs. previous year Volume	Chg. vs. previous year %
	Million bbl					
France	186	189	190	189	–3	–1.6
Germany	286	288	291	283	3	1.1
Italy	133	132	135	126	7	5.6
United Kingdom	100	106	105	99	1	1.0
Other OECD Europe	662	668	662	659	3	0.5
Total OECD Europe	**1,367**	**1,383**	**1,383**	**1,356**	**11**	**0.8**
Canada	186	182	183	170	16	9.4
US	1,729	1,719	1,688	1,730	–1	–0.1
Japan	619	611	615	627	–8	–1.3
South Korea	158	159	149	155	3	1.9
Other OECD	112	107	107	108	4	3.7
Total OECD	**4,171**	**4,161**	**4,125**	**4,146**	**25**	**0.6**

*End of period.
Source: DOE International Petroleum Monthly Report
Data available in OGJ Online Research Center.

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This report explains how the protean nature of condensate allows it to be used in a wide range of sectors: as a refinery slate component; in specialized distillation towers called condensate splitters; in direct feed to ethylene crackers; in gasoline blending and as a substitute for gas in turbine power generation. It can be defined as a base material, a blending component, a feedstock or a boiler feed.

See website for Table of Contents and sample tables, charts and graphs.

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CGES: Saudis cut output to lift crude price

Saudi Arabia has been limiting production to raise oil prices while blaming the effects on speculation and US refining problems, a London think-tank says.

"Saudi Arabia has been hugely successful in its attempt to raise oil prices," reports the Centre for Global Energy Studies (CGES) in its September-October Market Watch. "For the kingdom to claim that high oil prices are largely due to speculation or refining problems is disingenuous."

The Editor's Perspective

by Bob Tippee, Editor

In the first quarter of 2006, the group estimates, Saudi Arabia produced more than 9.5 million b/d of crude, above the quota assigned it by the Organization of Petroleum Exporting Countries. The OPEC basket crude price at the time was $58/bbl.

Apparently, that wasn't high enough.

The kingdom autonomously trimmed production by 360,000 b/d in April 2006 and by 150,000 b/d in May. By the following October, Saudi production had fallen by 640,000 b/d.

The OPEC basket price jumped to almost $70/bbl in July-August 2006. After OPEC announced production cuts late in 2006 and early in 2007, Saudi Arabia further trimmed output from 8.89 million b/d in November 2006 to a low of 8.53 million b/d the next April.

"There can be but one explanation," CGES says. "Saudi Arabia was determined to get the OPEC basket price back up above $60/bbl, which was achieved in April this year, and the price has not dropped below this threshold ever since."

To effect the output cuts, the kingdom lowered the discount offered on its heavy crude. The differential on Saudi Heavy bound for the US Gulf Coast fell from $14/bbl in January 2006 to a low of $6/bbl last May, CGES says. The shrunken discount against benchmark crude discouraged purchases of the low-quality oil.

Since May, the discount has risen to $10/bbl, and Saudi production has increased by an estimated 280,000 b/d.

CGES thinks Saudi Arabia didn't expect the OPEC basket price to climb, as it did, above $75/bbl.

"That the oil price rose so high attests to the dangers inherent in manipulating output to bring about what are intended to be relatively modest changes in the price of oil," it says.

(Online Oct. 12, 2007; author's e-mail: bobt@ogjonline.com)

Market Journal

by Sam Fletcher, Senior Writer

NOAA: La Nina signals moderate winter

The US National Oceanic & Atmospheric Administration (NOAA) forecasts this winter will be 2.8% warmer than the 30-year norm for the US in December through February but still 1.3% cooler than last year.

"La Nina is here, with a weak-to-moderate event likely to persist through the winter," said Michael Halpert, head of forecast operations and acting deputy director of NOAA's Climate Prediction Center.

The Societe Generale Group in Paris said, "This means temperatures start off colder in December but warm up towards February. While the winter is likely to be milder than average, NOAA warned that we should expect bouts of winter weather which should add to volatility."

Halpert said Oct. 9, "The big concern this winter may be the persistence of drought across large parts of the already parched South. And while December through February is likely to be another milder-than-average winter for much of the country, people should still expect some bouts of winter weather."

Above-average temperatures are projected for the Northeast and the Mid-Atlantic states as a result of a long-term warming trend. "Snowfall for the region will depend on other climate factors, which are difficult to anticipate more than 1-2 weeks in advance," NOAA officials said.

The drought-plagued Southeast is likely to remain drier than average, with above-average temperatures. Temperatures and precipitation should be above average in the Great Lakes and Tennessee Valley. The south-central plains also are expected to be warmer and drier than normal, with above-average temperatures in the central plains. However, NOAA officials said, "The northern plains has equal chances of above, near, or below-average temperature and precipitation. In the Northwest, there are equal chances for above, near, or below-average temperatures. Precipitation should be above average in much of the region due to La Nina."

Drought and above-average temperatures are expected to persist in the Southwest due to La Nina, officials said. Northern Alaska is expected to be milder than average, while the rest of Alaska has equal chances for either above or below-average temperatures and precipitation. In Hawaii, temperatures and precipitation are expected to be above average.

NOAA and other scientists base this forecast on studies of long-term climate trends and a variety of forecast tools from statistical techniques to extremely complex dynamic ocean-atmosphere coupled models and composites. The outlook will be updated Nov. 15.

In the interim, Societe Generale analysts report indications of price strength for the US gas market. "Canadian imports are down at 8.8 bcfd, which is below the 30-day average of 9.1 bcfd. LNG is at 700-800 MMcfd with sendouts over the past weekend dropping to 600 MMcfd. Strong global prices provide an incentive to ship elsewhere from the US," they reported Oct. 15. "US production was also off 3 bcf for the [latest] week, attributed to reduced supply moving out of western areas," said Societe Generale. EIA reported the injection of 73 bcf of gas into US underground storage in the week ended Oct. 5. That put gas in US storage at 3.336 tcf, 44 bcf less than a year ago and 237 bcf above the 5-year average.

As for market volatility, Societe Generale said, "Prices rose last week, but volatility dropped. Currently, volatility is 56.55%, about 2% higher than the 1-year forecast. In late September we witnessed annualized volatility levels of 71.25%, and we are experiencing considerably lower than levels witnessed in mid-August (92%)."

Record oil price

Robert S. Morris, Banc of America Securities LLC, New York, said, "Apart from some further intervention by Mother Nature, we believe it is more likely that there is further downside rather than upside to near-term natural gas prices. Oil prices, on the other hand, seem to have gained momentum leading up to winter and continue to underpin the strength in energy shares, and we believe that the E&P sector will continue to move in whatever direction commodity prices, particularly oil, move near term."

The front-month crude contract climbed above $84/bbl for the first time ever in intraday trading Oct. 12 on the New York Mercantile Exchange amid escalation of political tension in the Middle East. In early-morning electronic trading Oct. 15, crude jumped above $85/bbl after the Organization of Petroleum Exporting Countries raised its forecast for oil demand in the fourth quarter by 100,000 b/d. Concerns about a supply interruption also boosted prices due to tensions between Turkey and Iraq.

"Global oil demand has held up very well in the face of record oil prices in the second half of 2007, and we believe that concerns of price-driven demand destruction are overblown," said analysts with Raymond James & Associates Inc. in Houston.

(Online Oct 15, 2007; author's e-mail: samf@ogjonline.com)

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OFFSHORE West Africa

Welcome to Offshore West Africa 2008

As Chairman of the OWA Advisory Board, it is my pleasure to invite you to attend the 2008 Offshore West Africa Conference and Exhibition in Abuja, Nigeria.

The theme of this year's conference - ***"The Gulf of Guinea: Sustaining the Momentum of World Class Resource Development"*** – summarizes the challenge facing companies operating offshore West Africa.

As most of you know, improved oil and gas prices have stimulated industry activity, but at the same time have been accompanied by significant increases in the cost of equipment and services. The industry also is faced with an inadequate supply of trained and experienced personnel in virtually every facet of operation. Meanwhile, the search for hydrocarbons is moving into more hostile environments and greater water depths.

More than ever, the offshore industry in West Africa must rely on innovation in technology to unlock deepwater assets. New and improved technology must provide the capabilities to succeed in the face of these challenging circumstances.

The mission of OWA is to provide an annual forum that addresses those exact needs -- the technical, environmental and business challenges associated with oil and gas exploration and production offshore West Africa. The conference provides a unique networking opportunity for attendees to share technology and address issues with experts in their respective fields and to gain an understanding of the changes that are taking place within those technologies.

OWA also encourages the growth of local content within the industry and the development of young professionals. Newcomers to the industry have found OWA to be an effective forum at which to quickly gain an understanding of key deepwater technologies.

The 2008 program will focus on lessons learned from recent field developments, emerging technical solutions, and areas where new challenges still remain. The conference features the high-quality selection of papers that participants have come to expect. Session topics include:

- Regional Perspective & Capacity Development
- HSE & Security
- Offshore Drilling Technology, Completion & Pipelines
- Field Development & Architecture
- Sustainable Development, Ultra Deepwater & Innovative Technology
- Subsea Technology & Flow Assurance
- Offshore Operations Management
- Geosciences Reservoir Management
- Bonga – Lessons Learned
- Finance & Risk Management
- Local Content
- Gas Monetization
- Sustainable Development

On behalf of the OWA Advisory Board, PennWell Corporation and Offshore, the world's leading offshore oil and gas magazine, I am pleased to welcome industry leaders from West Africa and around the world to this unparalleled opportunity to exchange ideas, share solutions and learn from each other's experiences.

Chidi Izuwah
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Offshore West Africa Mission Statement

The mission of Offshore West Africa is to provide an annual technical forum in the region dedicated to the advancement of oil and gas exploration and production activities offshore Africa. This conference shall address the technical challenges to safely and cost-effectively develop both shallow water and deep water reserves. It shall also encourage the development of young professionals in the region.




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Event overview

The annual Offshore West Africa Conference and Exhibition remains the leading source of information on new technology and operating expertise for this booming deepwater and subsea market and is the most significant offshore Africa deepwater technology event in the world.

OWA 2008 offers:

- A unique audience of the world's leading executives, managers and engineers from major and independent E&P companies focusing on West Africa's specific requirements
- A world-class two-track technical conference program
- An exhibition showcase of technology and capabilities to support improvements in African E&P operations
- Expert opinions on the new issues, challenges and solutions associated with the expanding African exploration & production activity

A world class conference program

- Regional perspectives & capacity development
- Offshore drilling technology – completion & pipelines
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- Subsea technology & flow assurance
- Risers
- Geosciences & reservoir management
- Gas monetization
- Local content
- HSE & Security
- Field development & architecture
- Ultra deepwater & innovative technology
- Offshore operations management

Who attends Offshore West Africa

- Industry leaders who seek information and emerging technologies in order to plan future operations
- Multinational audience of senior executive decision makers from international and regional operators
- Service and equipment suppliers
- Engineering and construction companies
- Contractors
- Consultants

Information for visitors

About Abuja

Abuja became the capital city of Nigeria in December 1991 and is located in the Federal Capital Territory (F.C.T.). Abuja is Nigeria's first planned city, with an estimated population of 405,000.

International flights to Abuja International Airport are operated by British Airways (London-Heathrow), KLM Royal Dutch Airlines (Amsterdam), Lufthansa (Frankfurt), Virgin Nigeria (London-Heathrow via Lagos) and Hewa Bora Airways (Kinshasa D.R. Congo) and several domestic airlines operate services from Port Harcourt and Lagos.

Who should attend Offshore West Africa?

- Senior executive decision makers from international and regional oil and gas companies
- Offshore service and equipment suppliers
- Engineering & construction companies
- Contractors
- Consultants

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Tuesday 29 January 2008	08:00-19:00
Wednesday 30 January 2008	08:00-19:00
Thursday 31 January 2008	08:00-13:30

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Exhibition Information

Now in its 12th year, Offshore West Africa is the only established conference and exhibition dedicated to serving the needs of the offshore oil and gas sector in the region. The exploration and production industry is booming in West Africa, in particular among the major producing countries such as Nigeria and OPEC's newest member, Angola.

Large reserves of both oil and gas, and the move to increase reserves to 40 billion and daily production output to 4 million barrels by 2010, driven by the state owned oil company, Nigeria National Petroleum Company (NNPC) in conjunction with international oil companies such as Shell, ExxonMobil, Chevron, Total and Agip will ensure that the Nigeria oil and gas E&P market will be growing for the foreseeable future. Nigeria supplies 3% of the world's gas and has the capacity to produce much more.

By 2025 Nigeria will have the 20th largest economy in the world (Goldman Sachs)

In the wider region, recent ultra deepwater discoveries off Angola by BP Exploration, Sonangol and Total and further exploration off Equatorial Guinea will ensure plenty of activity offshore West Africa for the next few years. Investment in oil and gas continues to increase in order to help the world meet future demands and all of the offshore west African oil producing countries such as Nigeria, Angola, Gabon, Congo, Cameroon, Equatorial Guinea, Ivory Coast and Ghana will all reap the benefits to their respective economies in the coming years.

Offshore West Africa offers oil companies, their partners and all suppliers to the offshore industry a unique platform to showcase their products and services.

Sponsored by Offshore Magazine and Oil & Gas Journal, this event is the only conference and exhibition dedicated to the offshore oil & gas industry in the region, with more than 1,500 offshore professionals expected to attend the three-day conference and exhibition.

Exhibiting at Offshore West Africa will provide opportunities to:

- Meet strategic decision makers face-to-face
- Build relationships with clients and potential clients
- Raise brand awareness in the market place
- Source new suppliers and business partners

Other exhibitor benefits:

- Company listing on event website
- Listing in the official 2008 Conference Program – including company contact details and a 30-word description of your company

Who will attend?

- Industry leaders who seek information and emerging technologies in order to plan future operations
- Multinational audience of senior executive decision makers from international and regional operators
- Service and equipment suppliers
- Engineering and construction companies
- Contractors
- Consultants

Offshore West Africa attracts high level decision makers from across the region and from around the world:

- 48% Executive management (CEO, Pres, VP, etc.)
- 23% Engineering / technical / geoscience
- 9% Superintendent / field professional / foreman
- 6% Purchasing

What are delegates' main areas of interest?

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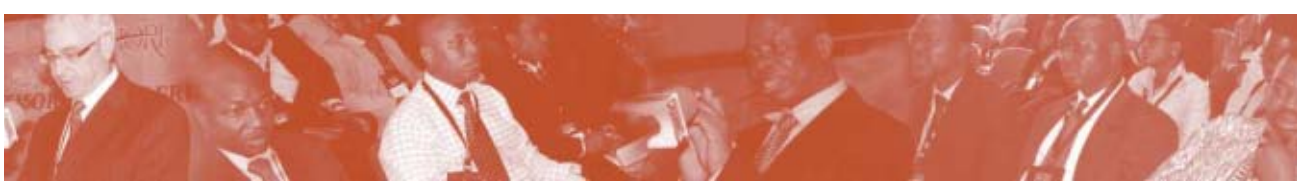

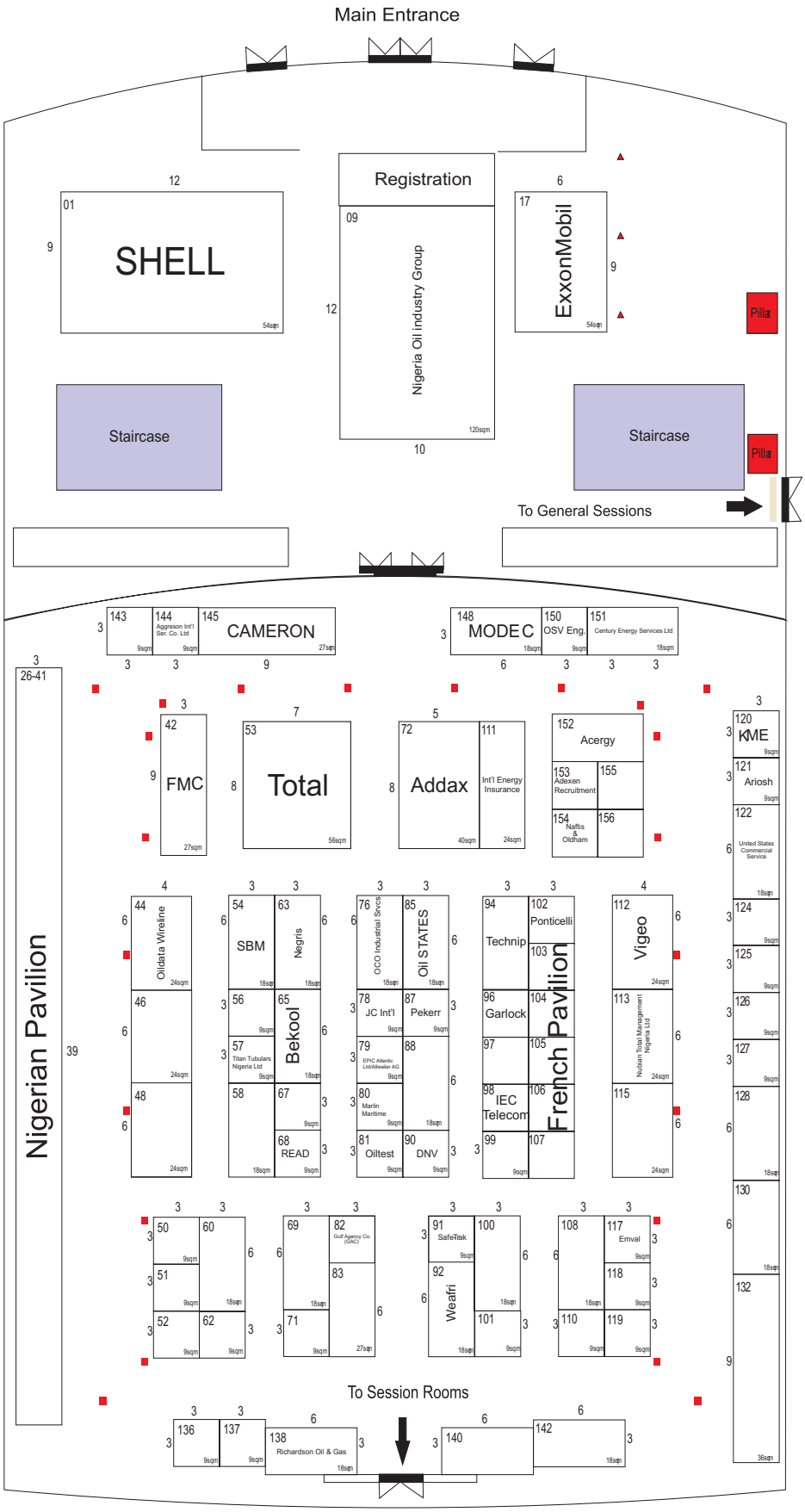

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Eunisell Ltd
FMC Technologies
French Pavilion
Fudia Petrochem
Garlock
Gulf Agency Company
Halliburton
IEC Telecom
International Energy Insurance
JC International Limited
KBR
KM Europa Metal AG
Marlin Maritime Limited
MODEC
Naftis
Negris Limited
Nubian Total Waste Management Nigeria Ltd
OCO Industrial Services Ltd
Oil States Industries
Oildata Wireline Services
Oiltest Services Limited
Oldham
OSV Engineering Pte Ltd
Pekerr Associates Ltd
Ponticelli
Prezioso
READ Well Services
Richardson Oil & Gas Limited
Safe-Track
Saft Power Systems
Shell Nigeria E&P
TD Williamson SA
Technip
Titan Tubulars Nigeria Limited
Vigeo Limited
Weafri Well Services Company Limited

List correct as at 1st October 2007

Tuesday January 29, 2008

09.30 - 11.00 OPENING SESSION
NIGERIAN NATIONAL ANTHEM
WELCOME & INTRODUCTION -- Eldon Ball, PennWell
OPENING ADDRESS -- Umaru Musa Yar'Adua, President of Nigeria -- Invited
KEYNOTE ADDRESS -- Marcos Assayag, Petrobras
REGIONAL PERSPECTIVE IN DEEP OFFSHORE -TBD, Shell Nigeria Petroleum Co.
GOODWILL MESSAGE -- Oil Minister, Angola
GOODWILL MESSAGE -- Oil Minister, Equatorial Guinea
MARKET FORECAST -- John Westwood, Douglas-Westwood

11.00 OFFICIAL EXHIBITION OPENING CEREMONY

12.00 - 14.00 LUNCH

14.00 - 15.30

SESSION 1a: REGIONAL PERSPECTIVES & CAPACITY DEVT.

Chair: Oluseyi Afolabi, ExxonMobil
Co-Chair: Oise Ihonde, Modec

14.00 - 14.30 **Increased Offshore Activities in the West African Subregion-NETCO's Imperative for Growth**
Taiwa H. O. Elegba - National Engineering & Technical Company Limited, A Subsidiary of NNPC, Nigeria

14.30 - 15.00 **Nigerian Content Development - Bridging the Human Capital GAP**
Akin Osuntoki - Richardson Oil & Gas Limited, Nigeria

15.00 - 15.30 **Developing Nigerian Deepwater Engineers and Engineering Capacity for the Future**
David March - Shell EP Projects, The Netherlands

SESSION 1b: HSE & SECURITY

Chair: Bright Oghor, Addax
Co-Chair: Phillippe Bonneau, Technip

Indigenous Contractors' Health, Safety and Environment Competence: A Possible Clog in the Wheel of Nigeria Content Development Drive
Jacob Ologe - Elf Petroleum Nigeria Limited, Nigeria

The Panacea for a Safe Deepwater Drilling
Sally Ekeng - Weatherford, Nigeria

Non-aqueous Mud Contaminated Drill Cuttings – Evaluation of their Environmental Impact and How Specific Thermal Technology can Best Minimise This
Olanrewaju Ayoola - Nubian Total Waste Management Nigeria Limited, Nigeria

15.30 - 16.00 COFFEE BREAK

16.00 - 17.30

SESSION 2a: OFFSHORE DRILLING TECHNOLOGY, COMPLETION & PIPELINES

Chair: Adeyemi Suara, SNEPCo
Co-Chair: Claude Berbigier, GEP

16.00 - 16.30 **Successful Shallow Kick-off in Soft Formation on Bobo-2x, an Ultra-deepwater Well**
Mark Ratchinsky - Shell Nigeria Exploration and Production Company Ltd., Nigeria

16.30 - 17.00 **Bonga Subsea Tie Back Wells - Challenges and Innovation Solutions**
Gbenga Odusami - Shell Nigeria Exploration and Production Company Ltd., Nigeria

17.00 - 17.30 **An Innovative Solution For High Speed Spooling Of Reeled Rigid Pipe In Open Sea. The Dande Spoolbase In Angola**
Romaing Vivet - Technip, France

Alternate: Improving Drilling Operations Using Time-Based Real Time Drilling Data, Han de Min, Aspen Technology

SESSION 2b: FIELD DEVELOPMENT & ARCHITECTURE

Invited Chair: John Addeh, Total
Co-Chair: Richard Taylor, DNV

Akpo, A giant Deep Offshore Development
Francois Rafin, Allain Laine, Benoit Ludot - Total, France

Escravos Gas Project 3A: Innovative Float-Over Design and Application
Duane Simmons - Chevron Nigeria Limited, Nigeria

Integrated Production system modelling for Enhanced Gas and Oil field development
A. Ekebafe - Shell Nigeria Exploration and Production Company Ltd., Nigeria

Alternate: New Generation TLPs for West Africa
William Rawles - Modec, USA

Wednesday January 30, 2008

09.30 - 11.00

SESSION 3a: SUSTAINABLE DEVELOPMENT
Chair: Blessyn Okpowo, Addax Petroleum
Co-Chair: Gabriel Obando, NNPC

09.30 - 10.00 Sustainable Development Policy-A Tool for Peace and Increased Production of Oil and Gas in the Niger Delta of Nigeria
Stephen Bentowe - State of NJ, USA

10.00 - 10.30 Emergence of Community Development Foundations: Depth of Foundations and Degree of Sustainability
Anthony Abolarin - Total, Nigeria

10.30 - 11.00 Developing a Sustainable FEED Facility
Femi Aisida - Shell Nigeria Exploration and Production Company Limited, Nigeria

SESSION 3b: ULTRA DEEPWATER & INNOVATIVE TECHNOLOGY
Chair: Chidi Izuwah, SPDC
Co-Chair: Annick Lia, Acergy

New Equipment Designs Enable Swellable Technology in Cementless Completions
Hank Rogers - Halliburton, USA

Wireless Technology Application in the Oil and Gas Industry: Solution for West Africa Offshore Fields
Godfrey Omokaro - SPDC Nigeria Limited, Nigeria

Swelling Rubber Technology - a Solution for Many Well Isolation Requirements
Henry Longden - Halliburton, Egypt

Alternate: Satellite Altimetry in Support of OGP Industry off Continental Shelf
Stefano Vignudelli - Consiglio Nazionale Ricerche - CNR, Italy

11.00 - 11.30 **COFFEE BREAK**

11.30 - 13.00

SESSION 4a: SUBSEA TECHNOLOGY & FLOW ASSURANCE
Chair: Robert Valk, Subsea 7
Co-Chair: Adeyemi Suara, Shell Nigeria Petroleum Co.

11.30 - 12.00 Overcoming the Challenges of Cost Effective Metering and Pumping Installations on Subsea Wells and their Impact on Associated Field Architecture
Brian Nutley - DES Operations Ltd. - United Kingdom

12.00 - 12.30 Long Tie-backs in Deep-water Environments - Addressing the Flow Assurance Issues
Gboyega Falope - Petro-Vision, United Kingdom

12.30 - 13.00 Remote Controlled (Tether-Less) Plugging
Gary Bishop - TDW Offshore, USA

SESSION 4b: OFFSHORE OPERATIONS MANAGEMENT
Chair: Tony Ofor, Shell
Co-Chair: Dr. Levi Ajuonuma, NNPC

Maintaining Production While Upgrading Facilities and Equipment
Todd Hutchinson - Hastec Services W.I., USA

Analysis of some Factors Used for Measuring Success in the Deepwater Operations
Okpala Faith - Nnamdi Azikiwe University, Nigeria

Facilities Status Reporting: Managing Integrity of Mature Facilities
Theo Ekiyor-Katimi - Shell Petroleum Development Company of Nigeria Limited, Nigeria

Alternate: Waste Water Polishing: Offshore Bulk Phase Separation and Hydrocarbon Extraction of LSA Contaminated Sludge and Aqueous Effluent Streams
Roger Quinn - CETCO Oilfields Services Company Nigeria Ltd., Nigeria

13.00 - 14.30 **LUNCH**

14.30 - 16.00

SESSION 5a: RISERS
Chair: John Addeh, Total
Co-Chair: Ricky Simic, Oil States Industries, Ltd

14.30 - 15.00 Riser Design Challenges OWA
Vigleik Hansen - Det Norske Veritas, Norway

15.00 - 15.30 Challenges and Solutions of the Flexible Riser System of the Mondo Development
Kent Caveny - Technip

15.30 - 16.00 Grouped SLOR Deep Water Riser System
Daniel Karunakaran - Subsea 7, Norway

SESSION 5b: BONGA - LESSONS LEARNED
Invited Chair: Oise Ihonde, Modec International
Co-Chair: Charles Adenji, Chevron

Application of Lessons Learned in SNEPCo Deepwater Projects
Kalada Hart - Shell Nigeria Exploration and Production Company SNEPCo, Nigeria

Operation Envelope Determination and Sand Control Performance at the Bonga Field, Deepwater Nigeria
E. Ageh - Shell Nigeria Exploration and Production Company Ltd., Nigeria

Integrated Surveillance and Reservoir Management of the Bonga Field, Deepwater Nigeria
H. Le Guen - Shell Nigeria Exploration and Production Company Ltd., Nigeria

16.00 - 16.30 **COFFEE BREAK**

16.30 - 18.00

SESSION 6a: GEOSCIENCES & RESERVOIR MANAGEMENT

Chair: Prof. Odebode, Sponsored by Total
Co-Chair: Nosa Omorodion, Schlumberger

16.30 - 17.00 Stratigraphic Evolution of a Niger Delta Intraslope Basin – Implications on Deepwater Reservoir Architectural Variation
Olusola Bakare - Chevron Nigeria Limited, Nigeria

17.00 - 17.30 Direct Identification of Hydrocarbon Filled Layers in Deepwater Areas of Niger Delta Using One-dimensional CSEM Modeling Method
Adekunle Adepelumi - Obafemi Awolowo University - Nigeria

17.30 - 18.00 Tracer-Test Opportunities in Reservoir Studies
Leonid Anisimov - LUKOIL - VolgogradNIPImorneft, Russia

Alternate: Neural network Characterization of XT field Niger Delta
Aminu Muslim - Obafemi Awolowo University, Ife-Ife, Nigeria

SESSION 6b: FINANCE AND RISK MANAGEMENT

Chair: Akin Osuntoki, Richardson Oil & Gas Ltd
Co-Chair: Gabriel Obando, NNPC

Deepwater Vessels, Cabotage Regime & Financing Options for Fleet Expansion in the Gulf of Guinea
Kingsley Uwagbale - Vigeo Farstad Shipping Ltd., Nigeria

Finance Tool Benchmark -- Akakinua Akpan - Nicon Insurance PLC, Nigeria

Finance & Risk -- TBD --Guaranty Trust Bank

Thursday January 31, 2008

08.30 - 10.00

SESSION 7: GAS MONETIZATION

Chair: Toyin Akinosho, Chevron
Co-Chair: James Ibe, ExxonMobil

08.30 - 09.00 Technology & Gas Fiscal Metering
St. Iyke Maxwell Ndubuisi - The Shell Petroleum Development Company SPDC, Nigeria

09.00 - 09.30 Offshore Platform Brownfield Modification in Nigeria Successful Strategies and Lessons Learned
Andrew Omomehin - Chevron Nigeria Limited, Nigeria

09.30 - 10.00 Novel Stochastic Approach for Offshore Stranded Gas Investment Analysis in Nigeria
Chike Nwonodi - Nigeria National Petroleum Corporation (NNPC), Nigeria

10.00 - 10.30 COFFEE BREAK

10.30 - 12.00

SESSION 8a: LOCAL CONTENT

Chair: Joe Akande, NNPC
Co-Chair: John Addeh, Total

10.30 - 11.00 Challenges of Sustainable Local Content Development in the Nigerian Oil Industry
Offiong Akpanika -University of Uyo, Nigeria

11.00 - 11.30 Successes in Local Content and Technology Transfer for Sustainable Development for the STAR Deepwater Petroleum Agbami Subsea System
Mike Robinson - FMC Technologies, USA

11.30 - 12.00 Erha and Erha North Development: Erha Subsea System Integration Test (SIT)
Dave Whiteley - Cameron Limited, UK

Alternate: Oil Industry in National Economic Development: Building Sectoral linkages for maximum impact
Bunmi Obembe, B. Eng; MBA; FNSE - Elf Petroleum Nigeria Limited, Nigeria

12.00 - 13.30 CLOSING SESSION & LUNCH

AWARDS CEREMONY

CLOSING REMARKS

OFFSHORE West Africa CONFERENCE & EXHIBITION

29- 31 January 2008
International Conference Centre
Abuja, Nigeria

CODE: OWA08PSG

First Name:..... Last Name:.....

Position:.....

Company:.....

Complete Mailing Address:.....

.....

.....

Postal code:.....

Telephone:..... Fax:..... Email:.....

Registration confirmation will be sent via-email, if a unique email address is provided above.

1. Type of Company or Organization:

- ☐ 10 Oil/Gas company
- ☐ 20 Consulting Company
- ☐ 30 Contractor
- ☐ 40 Engineering/Construction
- ☐ 50 Financial
- ☐ 60 Service/Supply
- ☐ 65 Government/Library/Education
- ☐ 70 Other _____

2. Job Function:

- ☐ 02 Management (CEO, Pres.VP)
- ☐ 05 Engineering/Technical/Geoscience
- ☐ 06 Superintendent/Field Professional/Foreman
- ☐ 10 Purchasing/Consulting
- ☐ 12 Other _____

3. Areas of Interest/Involvement:

- ☐ 10 Exploration
- ☐ 39 Financial
- ☐ 01 Production
- ☐ 29 Gas Processing
- ☐ 23 Pipeline/Transportation
- ☐ 19 Petrochemical
- ☐ 115 Refining
- ☐ 05 Drilling
- ☐ 46 Other _____

4. Purchasing Role: ☐ Specify ☐ Recommend ☐ Approve ☐ None

For Information on corporate packages, contact Linda Adams
Phone: +1 918 831 9160
Email: lindad@pennwell.com

3 ways to register:

Pre-register on line before 25 January 2008.
Register on site after 25 January 2008.

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Toll-Free (US only):
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2
Website:
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3
Mail:
PennWell C&E Registration (OWA)
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Dallas, TX 75397-3059 USA

For questions please call:
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·Access to the Exhibition Hall, including Opening & Networking Receptions
·Coffee Breaks in Exhibition Hall
·Delegate Lunch on Tuesday, Wednesday and Thursday (Ticketed)
·Conference Proceedings
☐ Paid By 29 October 2007 ☐ US$ 1,395
☐ Paid After 29 October 2007 ☐ US$ 1,595

2. Corporate Plan (10 delegates)*
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·Access to all Conference Sessions
·Access to the Exhibition Hall, including Opening & Networking Receptions
·Coffee Breaks in Exhibition Hall
·Delegate Lunch on Tuesday, Wednesday and Thursday (Ticketed)
·Conference Proceedings
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☐ Paid After 29 October 2007 ☐ US$ 13,560

Corporate Plan (11 to 20 delegates)*
☐ Paid By 29 October 2007 ☐ US$ 20,925
☐ Paid After 29 October 2007 ☐ US$ 23,925

3. Exhibitor Delegate
Exhibit booth staff can upgrade their registration to include access to the conference at a discounted rate
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·Access to Opening & Networking Receptions
·Coffee Breaks in Exhibition Hall
·Delegate Lunch on Tuesday, Wednesday and Thursday (Ticketed)
·Conference Proceedings
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☐ Paid After 29 October 2007 ☐ US$ 800

4. Young Engineer (35 or younger) African State Oil Companies & Other Government Agencies
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·Access to the Exhibition Hall, including Opening & Networking Receptions
·Coffee Breaks in Exhibition Hall
·Delegate lunch on Tuesday, Wednesday and Thursday (Ticketed)
☐ Paid By 29 October 2007 ☐ US$ 700
☐ Paid After 29 October 2007 ☐ US$ 800

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·Access to the Exhibition Hall, including both the Opening & Networking Receptions
·Coffee Breaks in Exhibition Hall
·Luncheon on corresponding day (Ticketed)
☐ Tuesday ☐ @ US$ 815/day
☐ Wednesday ☐ @ US$ 815/day
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7. Conference Proceedings ☐ US$ 225

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☐ Wednesday ☐ @ US$ 40/day
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TOTAL PAYMENT AMOUNT IN CASH
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*Your full-price registration fee includes a one-year paid subscription to Oil & Gas Journal (US$ 69.00 value).

Payment must be received prior to the conference. If payment is not received by the conference date, the registration fee must be guaranteed on charge card until proof of payment is provided. Make check payable to PennWell/Offshore West Africa 2008.

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OFFSHORE West Africa

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