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Saudi Aramco converts Yanbu fixed-bed reformer into CCR
Controlled emergency shutdown procedures aid line safety

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Dec. 10, 2007
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FINANCING ENERGY SUPPLY

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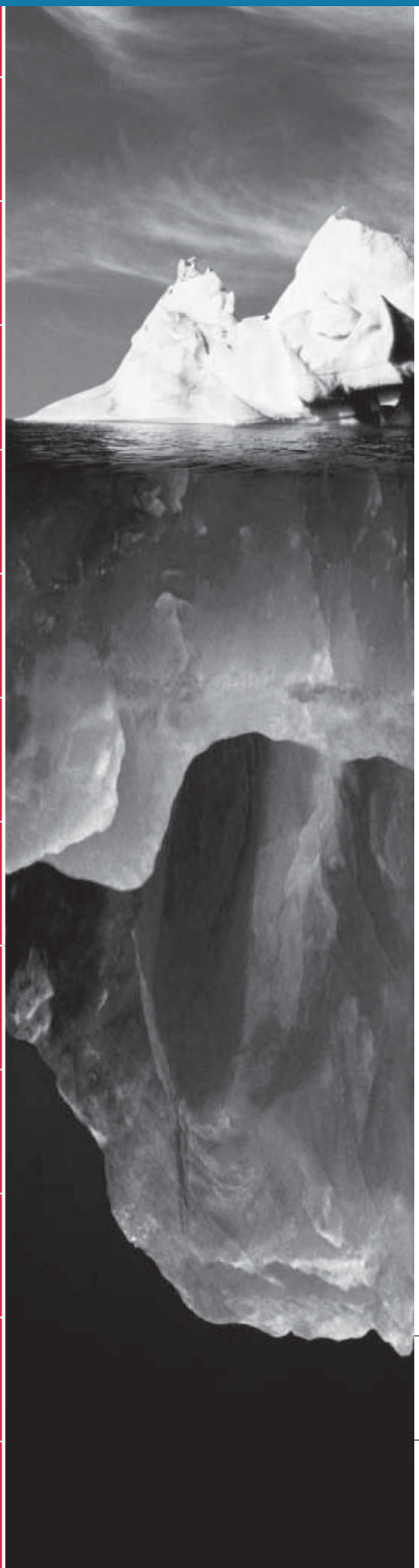
COVER

Ample financing is available for US independents through private equity markets, public equity markets, and bank loans. A special report beginning on p. 22 outlines the ways independents raise capital to finance exploration and development projects. Some companies are establishing upstream master limited partnerships. Others are turning to multilateral financial institutions for support. International Finance Corp., the private-sector arm of the World Bank, backed BPZ Energy Inc. with its operations in Peru. The cover shows BPZ's CX11 platform in Corvina field. During testing for oil in September, this well, the CX11-14D, tested a cumulative 2,400 b/d and 104 MMcfd of gas. The platform started oil production on Nov. 1. Photo from BPZ.



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OGJ Newsletter

Dec. 10, 2007

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General Interest — Quick Takes

Saudis foil Al Qaeda terrorist plots, arrest 208

Saudi Arabia said it has preempted a terrorist attack on its oil facilities in the eastern region of the country with the arrest of eight suspects said to be linked to the Al Qaeda terrorist organization.

An Interior Ministry statement said the eight were part of a terrorist cell led by a non-Saudi man, who also was arrested. It said the arrest of the eight pre-empted an imminent attack on an (unnamed) oil installation.

The ministry said the men were arrested as part of a security sweep that netted some 208 suspects either for plotting various terrorist activities in the country or supporting the Al Qaeda network.

One group of 18 suspects, led by an alleged expert in launching missiles, was arrested separately. "They were planning to smuggle eight missiles into the kingdom to carry out terrorist operations," the ministry said.

In August, Saudi Arabia announced plans to establish a 35,000-person strong special force to protect its oil facilities due to the increasing threats against them by the Al Qaeda network.

In April, Saudi authorities conducted a sweep that netted 172 alleged militants, including pilots authorities said were trained for attacks on oil refineries using civilian airplanes (OGJ Online, Apr. 27, 2007).

There have been several terrorist attacks on the country's facilities in recent years linked to the Al Qaeda network.

In February 2006, Saudi officials confirmed that a terrorist attack failed to disrupt operation of the Abqaiq crude oil processing facility, which handles as much as two thirds of the country's production and most of its exports from the Persian Gulf (OGJ Online, Feb. 24, 2006).

In May 2004, Saudi Arabian officials pledged better security in the country after a terrorist attack at its oil and petrochemical hub at Yanbu on the Red Sea, which left 6 dead and as many as 33 wounded (OGJ Online, May 3, 2004).

Petroecuador president named to quell unrest

Ecuador has appointed Navy Rear Admiral Fernando Zurita to head Ecuadoran State Petroleum Enterprise to deal with an emergency situation facing the state-run oil company.

The action was taken partly due to an urgent need to restructure Petroecuador but mainly to quell a public protest that has caused a drop in production at the Auca Sur, Auca Central, and Cononaco oil fields. "The forced interruption affects 47 oil wells, which means a daily loss of approximately $3 million, since they have stopped producing 36,000 b/d of oil, plus the damage done to oil field infrastructure," said Ecuador's President Rafael Correa in a statement.

Zurita's first mission will be to indict "on grounds of sabotage the unpatriotic people who inflicted the damage," a presidential decree said. The administration said it had not ruled out declaring a state of emergency in Orellana province.

Activists curb Petroecuador's Auca Sur oil output

Ecuador's state-owned Petroecuador said it has lost some 5,000 bbl of oil output due to a continuing protest by local villagers that disrupted operations in Dayuma, Orellana Province.

Petroecuador said a set of protesters blocked a bridge on Nov. 25, while other militants forced their way into the Auca Sur station and electric plant, "demanding that operators shut down the entire oil power system, provoking disorder and acts of vandalism."

On Nov. 26, the company said, more protesters reached the Auca 61D well and used dynamite to disable a hydraulic pump, effectively shutting down the installation.

The villagers are demanding jobs, electricity, and paved roads. But Petroecuador, describing the occupation as a terrorist action, said it had already met the villagers' demands to improve basic public facilities in the district.

Meanwhile, the firm warned of adverse effects from the protest, saying that "production losses will go on increasing every hour" that the complex remains shut down. Normal daily production at the Auca Sur field is about 176,000 b/d.

In March a blockade by protesters in the Amazon region forced the company to cut oil exports by 36,000 b/d for about a week.

Ecuador produces around 500,000 b/d of oil, making it the fifth-largest producer in South America.

Gas key to climate change, executive says

Natural gas must continue to be a major fuel in Germany's energy mix if climate change is to be addressed successfully, said Burckhard Bergmann, chairman of E.On Ruhrgas.

It is not enough to focus only on renewable energy to reduce carbon emissions, Bergmann said. Energy efficiency and cost input are also necessary.

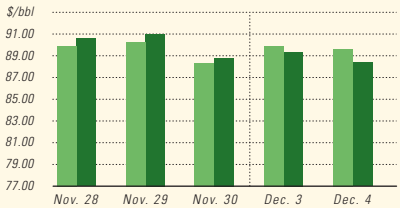
"A policy 'away from gas' will lead into a blind alley in energy policy," he said. "If the climate benefits of natural gas are not used, people will be buried by an avalanche of costs."

Investment in technology and the promotion of renewable energy must both be reflected in relevant legislation, Bergmann added.

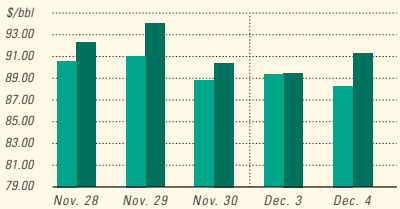
E.On Ruhrgas has launched Erdgas.On, which will focus on technologies that are environmentally friendly for the gas market. It also will develop the biogas market on a commercial scale and introduce the renewable as a motor fuel. ✦

Industry Scoreboard

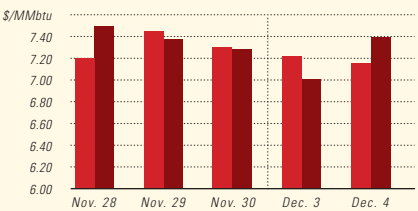
IPE BRENT / NYMEX LIGHT SWEET CRUDE



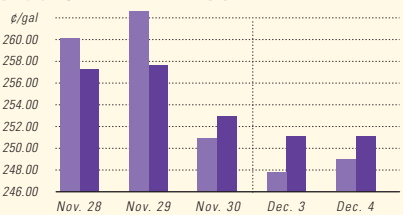
WTI CUSHING / BRENT SPOT



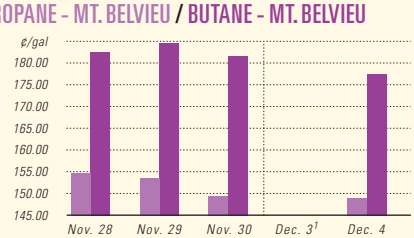
NYMEX NATURAL GAS / SPOT GAS - HENRY HUB



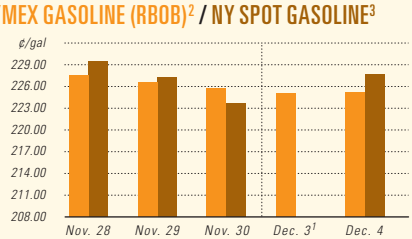
IPE GAS OIL / NYMEX HEATING OIL



PROPANE - MT. BELVIEU / BUTANE - MT. BELVIEU



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



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

US INDUSTRY SCOREBOARD — 12/10

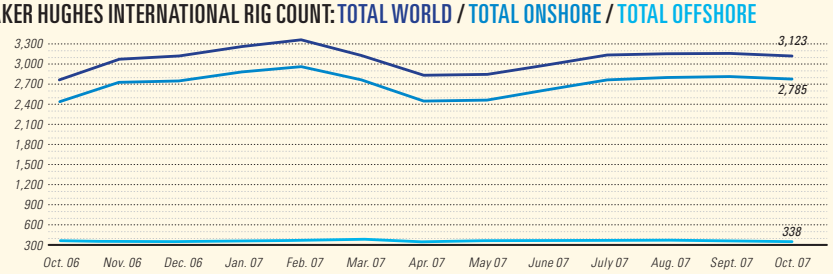
Latest week 11/23	4 wk. average	4 wk. avg. year ago[1]	Change, %	YTD average[1]	YTD avg. year ago[1]	Change, %
Demand, 1,000 b/d						
Motor gasoline	9,283	9,249	0.4	9,302	9,245	0.6
Distillate	4,423	4,209	5.1	4,230	4,159	1.7
Jet fuel	1,670	1,611	3.7	1,628	1,634	–0.4
Residual	635	544	16.7	745	689	8.1
Other products	4,864	5,078	–4.2	4,805	4,890	–1.7
TOTAL DEMAND	20,875	20,691	0.9	20,710	20,678	0.2
Supply, 1,000 b/d						
Crude production	5,080	5,105	–0.5	5,134	5,096	0.7
NGL production[2]	2,403	2,453	–2.0	2,382	2,218	7.4
Crude imports	10,079	9,935	1.4	10,011	10,168	–1.5
Product imports	3,355	3,137	6.9	3,505	3,641	–3.7
Other supply[3]	942	708	33.1	985	1,050	–6.2
TOTAL SUPPLY	21,859	21,338	2.4	22,017	22,173	–0.7
Refining, 1,000 b/d						
Crude runs to stills	14,939	15,008	–0.5	15,231	15,228	—
Input to crude stills	15,139	15,335	–1.3	15,468	15,586	–0.8
% utilization	86.8	88.2	—	88.7	89.7	—

Latest week 11/23	Latest week	Previous week[1]	Change	Same week year ago[1]	Change	Change, %
Stocks, 1,000 bbl						
Crude oil	313,153	313,605	–452	341,134	–27,981	–8.2
Motor gasoline	196,628	195,190	1,438	201,658	–5,030	–2.5
Distillate	130,916	131,005	–89	133,820	–2,904	–2.2
Jet fuel-kerosine	38,899	38,830	69	39,053	–154	–0.4
Residual	38,752	39,097	–345	42,727	–3,975	–9.3
Stock cover (days)[4]			Change, %		Change, %	
Crude	20.8	21.0	–1.0	22.6	–8.0	
Motor gasoline	21.2	21.0	1.0	21.8	–2.8	
Distillate	29.6	29.9	–1.0	30.1	–1.7	
Propane	48.3	48.7	–0.8	55.9	–13.6	

Futures prices[5] 11/30			Change		Change	%
Light sweet crude, $/bbl	92.49	97.04	–4.55	59.71	32.78	54.9
Natural gas, $/MMbtu	7..45	7.63	–0.18	7.91	–0.46	–5.9

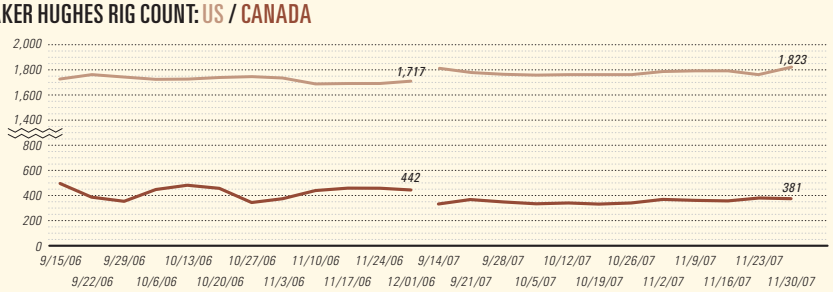
[1]Based on revised figures. [2]Includes adjustments for fuel ethanol and motor gasoline blending components. [3]Includes other hydrocarbons and alcohol, refinery processing gain, and unaccounted for crude oil. [4]Stocks divided by average daily product supplied for the prior 4 weeks. [5]Weekly average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

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



Note: Monthly average count

BAKER HUGHES RIG COUNT: US / CANADA



Note: End of week average count

Exploration & Development — *Quick Takes*

Apache finds gas with Jade-4 well in Egypt

Apache Corp., Houston, will complete the Jade-4 exploration well in Egypt's Western Desert as a gas and condensate producer after it flowed 23.8 MMcfd of gas and 2,107 b/d of condensate from the Jurassic Alam El Bueib-3G (AEB) formation.

Apache logged 234 ft of net pay in the AEB, which it described as one of the "most prolific reservoirs" in the greater Khalda concession. Jade-4 is adjacent to the Jade-1x discovery, which logged 217 ft of AEB pay and 66 ft in the Jurassic Upper Safa formation in March (OGJ Online, Apr. 3, 2007). "The discovery was completed as a gas producer from the Upper Safa after a test of 25.6 MMcfd of gas," Apache said.

It will carry out appraisal and development work next year along the Jade trend and will drill other prospects. After drilling three wells in Jade field along the Matruh Ridge, Apache has found hydrocarbons in four discrete reservoir intervals.

"The Jade-2x well is producing gas and condensate after testing over 20 MMcfd of gas from each of two AEB sands," Apache said. "In addition, oil pay was identified in another AEB sand behind casing in the Jade-1x and Jade-4."

G. Steven Farris, Apache president and chief executive officer, said the Jade discovery "was one of several higher-risk, higher-reward exploration prospects we have developed across the 37 million acres we have assembled in [the company's] core growth regions of Australia, Canada, and Egypt."

Jade is in the quarter-million-acre Matruh concession in which Apache holds a 100% interest.

Brazil awards five Santos basin blocks to Karoon

Melbourne-based Karoon Gas Australia Ltd. has been awarded five contiguous offshore exploration blocks in the Santos basin off Brazil—the same region as the recent 8 billion bbl Tupi oil discovery (OGJ Online, Nov. 16, 2007).

Karoon said the Brazilian permits are 300 km east-southeast of Tupi and 100 km from producing Caravela and Coral oil and gas fields.

The blocks—1037, 1101, 1102, 1165, and 1166—will be officially awarded next March when Karoon pays $25 million in non-refundable signature bonuses and refundable bid bonds.

Karoon has pledged a work program consisting of geological analysis along with the reprocessing and interpretation of existing seismic data. The company must acquire an additional 170-sq-km 3D seismic survey in three of the permits during the first 3 years. In an optional second 3-year term, one well is committed to each block.

Karoon was one of the successful companies that bid a total $1.5 billion in cash for 117 exploration blocks.

Heritage JV wins exploration license in Pakistan

Pakistan on Nov. 17 granted a petroleum exploration license for Block 3068-2 (Sanjawi) to a joint venture of Heritage Oil & Gas Ltd. 60%, Sprint Energy (Pvt.) Ltd. 30%, and Trakker Energy (Pvt.) Ltd. 10%. Heritage will serve as operator.

Block 3068-2, which lies in Zone-II, covers 2,258 sq km in the Loralai and Kohlu districts of Balochistan. The JV intends to invest $10.1 million in the block to carry out geotechnical studies; acquire, process, and interpret 330 km of 2D seismic data; and drill two exploratory wells during Phase I of the initial 3-year period.

This is Heritage's first exploration license in Pakistan. ✦

Drilling & Production — *Quick Takes*

StatoilHydro stops Ormen Lange gas production

Natural gas production from Ormen Lange field, the largest gas field in development on the Norwegian Sea's continental shelf, was stopped because of a gas leak in the export compressors. Ormen Lange, which lies 120 km northwest of Kristiansund, holds 397 billion cu m of proved gas reserves.

Field operator StatoilHydro AS expects production to resume Dec. 2 after it has carried out an inspection and repair work.

Gas from Ormen Lange is transported to the UK via the 600-km southern leg of the Langeled pipeline, which is expected to supply as much as a fifth of the UK's gas needs at full capacity rates.

The field, expected to supply 70 million cu m/day of gas and 50,000 b/d of condensate at peak rate, will position Norway as the world's second largest gas exporter after Russia. Gas can also be transported to European markets after it has been processed at the Sleipner hub.

The partners expect to produce gas from 24 subsea wells on the field and Royal Dutch Shell PLC assumed operatorship on Dec. 1.

CNOOC starts up platform in PL 19-3 field

CNOOC Ltd. has brought Platform C on stream in Peng Lai (PL) 19-3 oil field on Block 11/05 in Bohai Bay.

This is the first wellhead platform starting production in the field's Phase II development.

The facilities in Phase II development include five wellhead platforms, a central processing facility, and a world-class floating production, storage, and offloading vessel with a processing capacity of 190,000 bo/d and the capability to handle 510,000 b/d of total fluids (OGJ Online, Mar. 21, 2007).

PL19-3, the largest oil field off China, is being developed jointly by operator CNOOC 51% and ConocoPhillips China Inc. 49%.

Phase I of PL 19-3 went on stream in December 2002 from a single wellhead platform and a leased FPSO.

Petrobras starts tests at P-52 platform

Petroleo Brasileiro SA (Petrobras) on Nov. 23 began production tests at Platform P-52 in Roncador oil field in the Campos basin 125 km off Brazil.

P-52 is a semisubmersible production unit with a capacity to process 180,000 b/d of oil, to compress 9.3 million cu m/day of

gas, and to inject about 300,000 b/d of water into the reservoir (OGJ Online, Nov. 7, 2006). It is installed in 1,800 m of water, a Brazil record.

The platform initially will handle volumes of about 20,000 b/d but is expected to reach its total capacity of 180,000 b/d in mid-2008 when it will be interconnected to 18 production and 11 water injector wells.

The platform's hull was built in Singapore, and its operating modules were manufactured in Brazil.

Gasification project planned in North Dakota

Great Northern Power Development LP (GNPD), Houston, and Allied Syngas Corp., Wayne, Pa., have developed a $1.4 billion coal gasification project in southwestern North Dakota.

The project, designated South Heart, will use coal in a chemical process to create substitute natural gas.

The South Heart project involves seven British Gas Lurgi gasifiers that will use North Dakota lignite to produce up to 100 MMcfd of pipeline-quality synthetic gas.

Existing pipelines will transport the gas throughout North America, GNPD said.

The BGL technology is owned jointly by Envirotherm and Advantica Ltd., both of which will provide the technology license, process design, and related technical support for the gasification process.

GNPD owns much of the coal reserves that will fuel the project. ✦

Processing — *Quick Takes*

Fire shuts down second Saudi refinery

Fire has shut down a Saudi Arabian refinery, according to a statement by Saudi Aramco Lubricating Oil Refining Co. (Luberef). It is the second fire-related accident at an Aramco facility in a month.

Luberef said the fire broke out Dec. 1 at one of its refineries south of Jiddah but was put out quickly with no casualties. It did not mention which of its two refineries was closed.

Luberef operates refineries in Jeddah and Yanbu for the production of lubricating base oils. The combined design capacity of Luberef's two refineries is 550,000 tonnes/year.

In the statement, Luberef Chief Executive Omar Bazuhair said the fire would not affect the company's supplies, and the refinery would be reopened "within a short period of time after carrying out some tests on the products."

Bazuhair said the fire started in a storage tank when a malfunctioning cooling fan ignited a propane leak.

In an earlier accident, 28 people were killed and another 10 injured on Nov. 18 when an explosion ignited a fire along the Haradh-'Uthmaniyah gas pipeline in Saudi Arabia's Eastern province. Saudi authorities ruled out any terrorist connection with the accident (OGJ Online, Nov. 19, 2007).

In late November, the Saudi government reported that it had preempted a terrorist attack on its oil facilities in the eastern region of the country with the arrest of eight suspects said to be linked to the Al Qaeda terrorist organization (OGJ Online, Nov. 29, 2007).

Luberef was founded in 1976 as a joint venture of Saudi Aramco 70% and ExxonMobil 30%. In early November, Saudi Aramco said Jadwa Investment Co. had reached an agreement to acquire ExxonMobil's 30% stake in Luberef.

Total, Sonatrach plan Algerian petchem complex

Total SA and Algeria's Sonatrach have signed a framework agreement to build a $3 billion petrochemical complex with a 1.4 million tonne/year ethane cracker in Arzew, near Oran, by 2012. The signing follows a memorandum of understanding signed in July (OGJ Online, July 19, 2007).

The facility will produce 1.1 million tonnes/year of ethylene, which will be processed into polyethylene (two units with a total capacity of 800,000 tonnes/year) and monoethylene glycol (550,000 tonnes/year). The companies plan to issue technology tenders for the units.

Total will invest over $1.5 billion in the complex, which will export most of its products. Feed gas from fields in southern Algeria will be used at the complex.

Total Chief Executive Christophe de Margerie said the project would expand the company's petrochemical activities based on world-class facilities. "It signals our entry into Algeria's petrochemical industry and strengthens the existing partnership between Total and Sonatrach in oil exploration and production."

Total holds a 51% stake in the joint venture and Sonatrach 49%.

China's NDRC okays Sinopec, KPC JV

China's economic planning agency, the National Development and Reform Commission (NDRC), has approved a joint refinery venture project between China Petroleum & Chemical Corp. (Sinopec) and Kuwait Petroleum Corp. (KPC) in southern China's Guangdong province.

Sinopec last year agreed to establish a $5 billion joint venture refinery with KPC in the Guangdong city of Nansha, with a refining capacity of as much as 15 million tones/year and an ethylene capacity of 1 million tonnes/year.

Sinopec gave no timetable for the project, but once it is online, NDRC has ordered Sinopec to shut down its 200,000 tonne/year capacity ethylene facility operated by Sinopec Guangzhou.

PetroSA mulls major South Africa refinery

Petroleum Oil & Gas Corp. of South Africa (PetroSA) has hired KBR to assess the feasibility of constructing a 200,000 b/d refinery at Coega in Port Elizabeth, South Africa, by 2014-15.

The refinery, entitled Project Mthombo, is expected to cost $6 billion. KBR described the proposal as one "of the largest post-2010 investments in South Africa."

Under the 6-month prefeasibility study, KBR will examine the economic optimum configuration for the refinery, including crude oil type and costs, required product slate, prices, and specifications, and capital and operating costs. "After the configuration has been approved, Project Mthombo will move on to the feasibility

phase, which will define the engineering scope of the refinery," KBR said.

Project Mthombo is an important strategic element to cut South Africa's reliance on imported automotive fuels. If successful, it could be expanded to allow for products exports or other growth opportunities and could be integrated with downstream petrochemical opportunities.

Job opportunities for 20,000 South Africans will also be available if the refinery is constructed in one of the most impoverished provinces in the country.

PetroSA said several South Africans would work closely with KBR on the prefeasibility study. KBR is the engineering and construction unit of Halliburton, Houston. ✦

Transportation — *Quick Takes*

UK's Milford Haven gas pipeline commissioned

UK pipeline operator National Grid PLC has commissioned the final section of the Milford Haven-Tirley pipeline, which will deliver gas from the Milford Haven LNG terminal into the national transmission system at Tirley in Gloucestershire.

Gas transport along the 316 km pipeline will start by mid-December. National Grid completed the project in 3 years.

The Milford Haven-to-Aberdulais pipeline was commissioned last month, and the section from Brecon to Tirley also has been tested and filled with gas.

Opening the valve energy minister Malcolm Wicks said: "National Grid's new pipeline will be able to carry 20% or more of the UK's gas needs once imports into Milford Haven start next year, and it will also help to secure Wales' energy supply for many years." In the past, Wales's gas has been piped through England and Scotland. "Now for the first time, Wales is at the front end of the UK's gas supply system," said Wicks.

Gazprom, Eni sign South Stream pipeline deal

Russia's OAO Gazprom and Eni SPA of Italy signed an agreement to build the projected 560-mile South Stream gas pipeline under the Black Sea and through Bulgaria.

The agreement, seen by both sides as a strategic development in the supply of energy to Europe, was signed as part of Italian Prime Minister Romano Prodi's visit to Russia for talks with President Vladimir Putin.

"Russia and Europe are interdependent. Europe needs Russia and Russian needs Europe," said Prodi, who added, "We need to move as quickly as possible toward a strategic partnership."

"The South Stream project is of strategic importance for Europe's energy security," Putin said. "It is being implemented based on principles of transparency and taking into account interests of energy suppliers and consumers," he said. Officials from Gazprom and Eni signed the agreement to establish 50:50 joint venture to develop a marketing and feasibility study for the pipeline.

On completion, the $10 billion line eventually could distribute gas to northern and southern Europe, with an estimated annual capacity of 30 billion cu m. "The new pipeline system, which complies with the strictest technological and environmental criteria, will significantly improve the security of supply of the whole of Europe," Eni CEO Paolo Scaroni said.

Gasunie joins Nord Stream, BBL consortiums

JSC Gazprom has formally accepted NV Nederlandse Gasunie into the consortium that plans to build the 27.5 billion cu m/year Nord Stream pipeline to deliver Russian gas to Europe starting in 2010.

Gasunie also will join the partners that developed the Dutch Balgzand Bacton Line (BBL), which started operations last year and sends gas from the Netherlands to the UK. The deal builds on a memorandum of understanding signed last October in which Gasunie expressed an interest in cooperating on Nord Stream and BBL.

Under an umbrella agreement signed Nov. 6 by both companies, Gasunie will acquire a 9% share in Nord Stream AG, with consortium members Wintershall AG and E.On Ruhrgas AG reducing their interests by 4.5% each. Gazprom also will have an option to acquire a 9% interest in BBL Co. When the deal is executed, shareholdings in Nord Stream will be Gazprom with 51% share, Wintershall and E.On Ruhrgas with 20% each, and Gasunie 9%.

According to the agreement, Gazprom also will gain access to transport capacity within Gasunie's network, which has an annual throughput of about 100 billion cu m. The Netherlands' position as a gas hub for northwest Europe is of particular interest to Gazprom.

The revised shareholdings in BBL Co., if Gazprom utilizes its option, will be Gasunie will keep 51%, E.On Ruhrgas and Fluxys 20% each, and Gazprom 9%. Gazprom Chairman of the Management Committee Alexei Miller and Gasunie Chief Executive Marcel Kramer said the new partnership would enable delivery of secure gas supplies to Europe, particularly as domestic production is falling and gas demand increasing.

Cosco Busan detained in US following spill

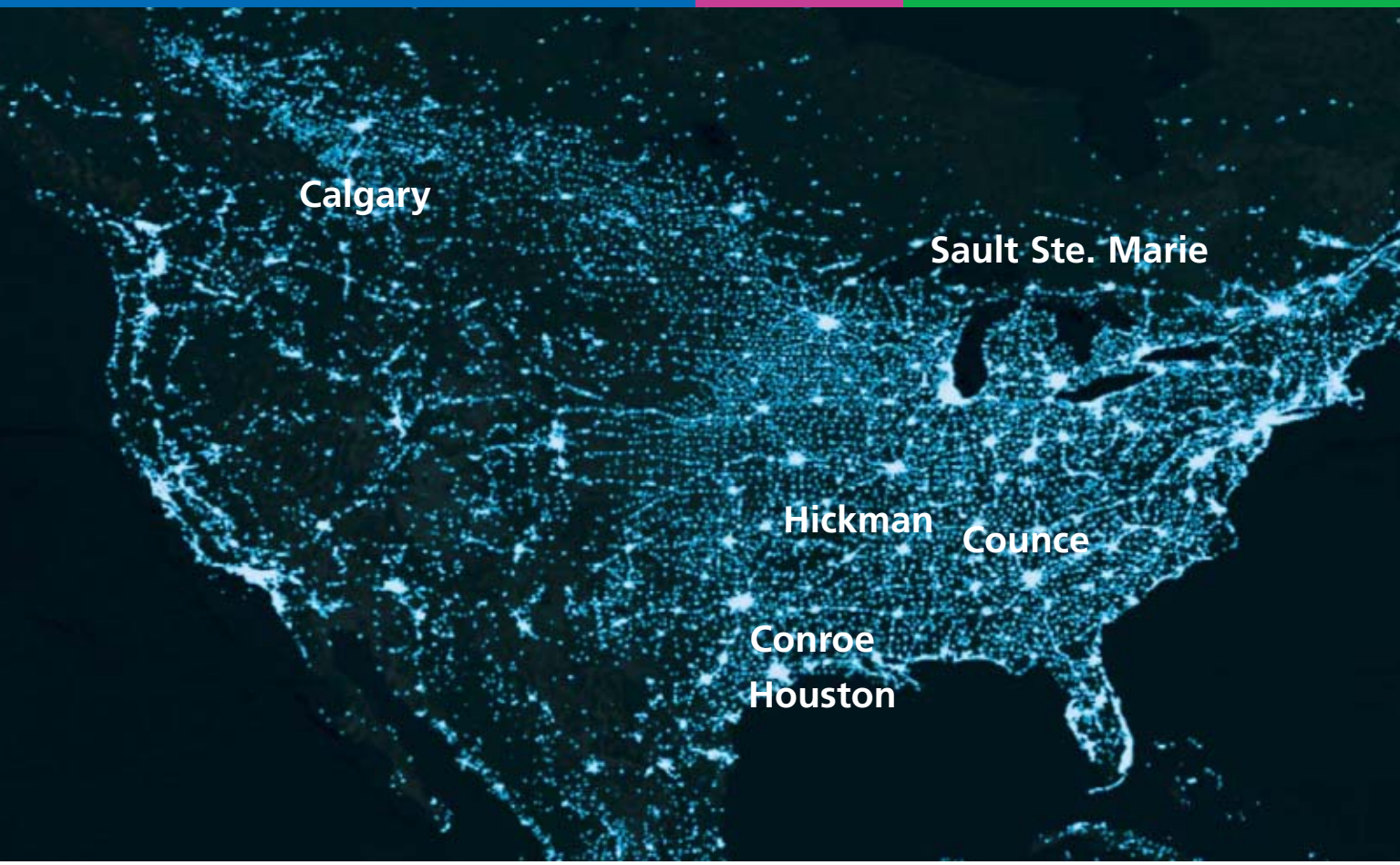
Audet & Partners LLP, attorneys who earlier filed a class action lawsuit representing the fisherman, boat operators, and other alleged victims of the Nov. 7 oil spill into San Francisco Bay, have obtained a court order authorizing the "arrest" of the Cosco Busan to keep the vessel from leaving the country.

"Under well-established maritime law, in these circumstances, it is appropriate to make sure the vessel involved in the oil spill does not leave the jurisdiction of the United States," said William M. Audet of Audet & Partners.

The US District Court issued an order Nov. 20 granting the plaintiff attorneys' request to arrest movement of the Cosco Busan.✦

Correction

The byline for coauthor Maria Victoria Vargas, an attorney with King & Spalding LLP and a member of its global transactions practice group, was inadvertently omitted from the article, Changing oil and gas fiscal and regulatory regimes in Latin America (OGJ, Dec. 3, 2007, p. 20).



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Letters

Shale shaker screens

The article "Norwegians develop new method to measures shaker screen performance" indicated correctly that the simple designation of a "mesh" size could no longer be used when describing current shale shaker screens (OGJ, Nov. 19, 2007, p. 37). An American Petroleum Institute task group working on solids control procedures also found that the optical image size distribution curve resembled a classic cut point curve but failed to match field data.

The task group first sought to develop a universal procedure similar to that described in the OGJ article to describe performance of shaker screens. This seemed to have too many variables to be universally applicable for all shaker motions and all water-based fluids and all nonaqueous fluids (NAFs). The most prominent of these screen performance modifiers is the fact that the bound liquid layer affects the effective screen opening size particularly with screens having very small openings. The most dramatic, of course, is the blinding of these screens in a NAF when the screen becomes water-wet. The bound layers of wetting fluid have different thicknesses. Some of the properties controlling this involve surface tension properties (that are usually not measured) and gel strengths depending upon the viscosifiers used in the drilling fluid. This will greatly affect the opening size for particles to pass through. The task of defining screen performance for all fluids and all shaker motions seemed too large for the API task group to develop recommended procedures (RPs) that could be universally applied.

As indicated in the article, the new API RP 13C does not attempt to describe shaker screen performance. The objective of the test procedure is simply to describe a shaker screen in a reproducible manner. Aluminum oxide particles were selected because they were the only particles which gave reproducible results in blind comparison tests.

Sand was the first choice because sand can be found in abundance worldwide. Blind comparison tests revealed that the data was not reproducible. The next

choice was glass beads. Blind comparison tests by the service companies represented on the task group revealed that these data were not reproducible. Glass beads were also not a good representation of cuttings arriving at the surface in a borehole that had adequate cuttings carrying capacity. Rounded cuttings on the shaker indicate poor hole-cleaning from tumbling action in the annulus. Aluminum oxide grit provided good reproducibility, and microscopic examination revealed that the particles resembled shale cuttings that had been circulated from boreholes with good hole-cleaning.

As mentioned in the article, it was never the intention of the API task group to describe shale shaker screen performance. API RP 13C simply provides an indication of the largest openings in a shaker screen. The distribution of openings does not give a good picture of performance because the small cuttings do not seek only holes their size. Many go through the large openings. However, if a screen is labeled a 200 mesh, it should retain particles larger than 75 µm. Testing with the new API procedure revealed that many of the screens that were labeled as 200s were not retaining particles that were 150 µm in size. Needless to say, many manufacturers were very upset because screen designations had to be changed from 200 to 80.

As an International Organization for Standardization document the concept of "mesh" would make no sense. "Mesh" is defined as the number of openings per inch in each direction. Changing to metric units would mean that the "mesh" would need to be openings per millimeter. Clearly, rig hands would have trouble translating this from their previous knowledge base. This is the reason that the new screen designation is the alternative designation of an API number. An API200 screen would have the equivalent of a 200 mesh opening. Below that number, the actual measured largest particles retained on the screen would be recorded in microns. The word "mesh" is no longer being used to describe shaker screens.

While the new API RP 13C does not give any information about performance, it would seem reasonable that a screen that retains 75 µm dry particles would remove more solids than a screen which lets all of those particles pass through.

Mark Morgan, *Vice-Chairman*
Leon Robinson, *Chairman*
API Subcommittee on Drilling Completions, and Fracture Fluids (RP 13)
Task Group 5

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

DECEMBER

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.

2008

JANUARY

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

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

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

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

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

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

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

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

Calendar

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.

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

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

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

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

MARCH

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SMN/SPE European Sand Management Forum, Aberdeen, +44 (0) 1483 598000, +44 (0) 1483 598010 (fax), e-mail: dawn.dukes@otmnet.com, website: www.sandmanagement.com. 18-19.

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

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

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

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

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

APRIL

SPE/ICoTA Coiled Tubing & Well Intervention Conference & Exhibition, The Woodlands, Tex., (972) 952-9393, (972) 952-9435 (fax),

e-mail: spedal@spe.org, website: www.spe.org. 1-2.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Calendar

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

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

MAY

IOGCC Midyear Meeting, Calgary, Alta., (405) 525-3556, (405) 525-3592 (fax), e-mail: iogcc@iogcc.state.ok.us, website: www.iogcc.state.ok.us. 4-6.

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

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

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

SPE Deepwater Forum, Phuket, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 11-16.

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

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

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

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

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

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

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

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

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

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

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

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

JUNE

SPE Reservoir Geomechanics Forum, Colorado Springs, Colo., (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 1-6.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

JULY

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

Colorado Oil & Gas Association Conference, Denver, (303) 861-0362, (303) 861-0373 (fax), e-mail: conference@coga.org, website: www.coga.org. 9-11.

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

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

AUGUST

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

SPE R&D Meets Reality—Technologies That Will Make a Difference Forum, Kananaskis, Alta., (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 24-29.

SPE Steam Generation Forum, Kananaskis, Alta., (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 24-29.

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

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

SEPTEMBER

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

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

API Fall Refining & Equipment Standards Meeting, Los Angeles, (202) 682-8000, (202)

682-8222 (fax), website: www.api.org/events. 15-17.

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

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

GEO India Event, New Delhi, +973 17 550033, +973 17 553288 (fax), e-mail: aeminfo@batelco.com.bh, website: www.allworldexhibitions.com/oil. 16-19.

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

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

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

OCTOBER

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

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

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

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

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

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

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

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

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

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

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

SPE Improved Recovery in Offshore Reservoirs Forum, Dominican Republic, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 26-31.

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

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

NOVEMBER

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

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

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

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

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

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

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

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

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

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

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

DECEMBER

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

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

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

Pipeline Rehabilitation & Maintenance Conference & Exhibition, Manama, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.piipeline-rehab.com. 8-10.

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

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

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

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

2009

JANUARY

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

FEBRUARY

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

MARCH

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

MAY

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

JUNE

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

OGJ on the move

Marilyn Radler
Senior Editor-Economics

The Houston offices of OGJ are moving this week. After 10 years at 1700 West Loop South, this staff and all other PennWell employees in Houston will relocate. The "old" office is abuzz with extra activity while staffs continue to meet daily and weekly deadlines.

The new office is across the freeway a couple of blocks away, but the proximity doesn't ease the transition. Or the packing. So much material, like conference proceedings, notes, and publications, can accumulate in a decade.

The last time OGJ's Houston staff relocated offices, this editor had only been on board for slightly more than a year, and so the task of packing—and deciding what to throw out—was simpler. There wasn't as much stuff on the shelves.

But now the contents of my bookcases and filing cabinets hadn't been properly culled in a while. So once the process began, it was a dusty trip back into the oil and gas statistical world. There were issues of world energy forecasts from various agencies, some dating back to, yes, 1997.

Many of the regular publications, such as IEA's Monthly Oil Market Report, EIA's Natural Gas Monthly, and API's Quarterly Well Completion Report, are no longer available in print. Instead, they are now only available to download or access online. This helps when moving offices.

The large orange trash bin conveniently located near my office space soon began to look like the purging of an energy economist's library. Following about an hour's worth of expunging, a couple of bookshelves looked barer. Hopefully much of this discarded material will be recycled.

Typical sight around the office.

Milestones

OGJ celebrated 100 years in print while we occupied this office. That was during 2002.

Since 1997, the oil and gas markets have seen volatility, of course. That year, the average front-month futures price of oil on the New York Mercantile Exchange was $20.59/bbl. The following year the average sank to $14.42/bbl.

Last month, the closing price for crude on the NYMEX reached as high as $98.18/bbl. And for 2007, the front-month closing price will average about $71/bbl.

Regular unleaded motor gasoline pump prices averaged $1.23/gal during 1997, and this year the average will be about $2.78/gal.

Worldwide demand for crude oil has climbed more than 15% in the past decade. According to IEA, demand averaged 73.6 million b/d 10 years ago and will average 85.7 million b/d this year.

Looking ahead

This time of year not only brings this office move for OGJ, it also brings forecasts for 2008. The recent climb to near-$100/bbl for crude brought a lot of attention to such predictions for oil supplies and demand. How much demand growth we can expect depends on assumptions about the health of the economy. Much speculation is swirling.

OGJ will publish its short-term forecast next month. After we're settled in our new space, we will have a clearer view to the future.

Our new physical and mailing address will be 1455 West Loop South, Suite 400, Houston, TX 77027. Phone numbers and e-mail addresses are unchanged. ✦

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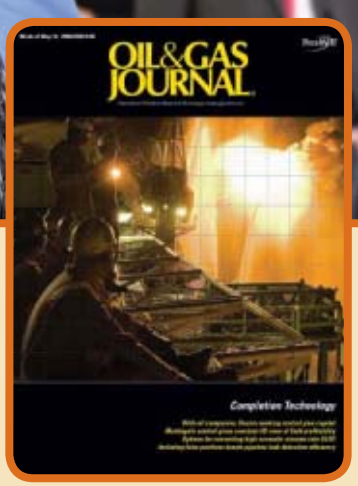

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"Great resource to stay on top of recent industry news and trends."

"Extremely useful. Of all trade publications, this is the one we rely on."

"Oil & Gas Journal is my connection to the industry."

"I would not be without it!"

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

PennWell®

Editorial

Energy and tax reform

A wisp of hope drifts around the murk of energy legislation under development in the US. It's a federal tax system on the verge of self-destruction.

As the first session of the 110th Congress approaches its end, Democratic leaders are desperate to pass an energy bill. Because reconciliation of disparate measures passed by the House and Senate requires a political fight no one seems to want, the House leadership has been circulating revised legislation they hope can pass.

The discussion draft first jettisoned then reimposed tax increases on the oil and gas industry. But it retained a martial approach to energy markets, with toughened fuel-economy standards for new motor vehicles and aggressive mandates for fuels from biological and other renewable sources.

Hamstringing markets

Like all such intrusions, these measures would hamstring markets and reward uncompetitive energy sources. They should be resisted. Current experience with mandates for ethanol in vehicle fuel—with the extraordinary pressure on corn prices, increases in diesel demand, and erosion of federal tax receipts—shows what happens when politicians make fuel choices for consumers.

An essential tool of governmental fuel manipulation is the tax regime. No one will sell mandated fuels that lose money. When the government requires sales of uncompetitive fuels, therefore, it must compensate the sellers. The handy way to do this is to provide tax breaks, such as the 51¢/gal tax credit for ethanol blenders and $1/gal credit for producers of biodiesel. The Energy Policy Act of 2005, in fact, is a cornucopia of tax breaks for suppliers of politically preferred fuels and vehicles. It's also an affront to market efficiency.

The tax tool's future, however, is in doubt. Two politically intolerable tax increases loom, calling attention to the need for systemic reform.

Next year, unless Congress acts, hoards of middle-class taxpayers will find themselves newly subject to the alternative minimum tax (AMT). Congress enacted the levy to ensure that the very wealthy pay income tax. But it didn't account for inflation, which over time has pushed liability thresholds into lower and lower incomes. And in 2010, again unless Congress acts, income tax bills for many voters will leap as rate cuts enacted in 2001 and 2003 expire.

In anticipation of the AMT trap, House Ways and Means Committee Chairman Charles Rangel (D-NY) has proposed what he calls tax reform. It's really a huge tax hike on Americans earning above $200,000/year to offset what Rangel sees as revenue losses from repeal of the AMT. While Rangel's economically poisonous measure deserves no serious consideration, it does perform two useful services. With its prospective increase in marginal tax rates—those applying to new increments of income—of nearly 5 percentage points, the initiative calls attention to flagging US competitiveness in a crucial area. And it gives a needed push to tax reform as a political issue.

Reform is overdue. The US tax regime is unfathomable, largely because Congress has added layers of credits, deductions, exclusions, and other adjustments over the years to advance political agendas and enrich friends. For many Americans, compliance with tax law requires guesswork or payment to tax experts whose interpretations often differ. The ambiguity makes a sham of the rule of law and is reason for simplification to have occurred years ago.

Pressure for change

With millions of Americans facing two painful tax increases—one in an election year and the other as a new President faces off-year congressional elections—pressure will grow for fundamental change, such as with a flattening of rates or national sales levy in place of income taxation. Either move would involve elimination of most or all deductions and credits, which in turn would deprive politicians of a vital lever of fuel control.

Oil and gas companies should welcome tax reform as a way to liberate markets and give fuel choice back to fuel consumers. Yes, reform would deprive them of some tax breaks. But the reward would be an energy market more resistant than it has been to distortion by the government and to corruption by special interests. ✦

US independents explore ample financing options

Paula Dittrick
Senior Staff Writer

Robust oil and gas prices have contributed to an abundance of capital readily available to the oil and gas industry through the public equity market, the private equity market, and bank financing. An independent producer must negotiate a maze of financing options.

John Schaeffer, managing director and head of oil and gas investing at GE Energy Financial Services, sees "a plethora" of financing choices for small oil and gas companies.

"There have never been more options for the small producer to get financing, and it's never been more confusing," Schaeffer said. He believes independents now have the most financing options available since 1975 when he entered the energy finance business.

Any financing product introduced since the 1970s is available currently, he said, adding that this includes master limited partnerships (MLPs) for upstream companies.

James Burkhard, managing director of the Cambridge Energy Research Associates oil and gas group, said high oil and gas prices attract investors. Prices increased dramatically over the past 3 years.

Currently, $50/bbl for benchmark US light, sweet crudes on the New York Mercantile Exchange is considered low. The year-to-date price for oil as of late November was $70/bbl, he said.

"Prices in the high $90s to $100/bbl and over push both the economy and geopolitics into uncharted waters," Burkhard said. "The unprecedented $30 surge in oil prices since August—from $70 to $100—reflects a sharpening mix of concerns about the value of the dollar, the adequacy of oil supplies, and economic weakness—combined with an Iran premium."

He said if oil prices were to average $110/bbl for 6 months, it would increase the world economy's vulnerability to a serious downturn of the early 1980s. But he foresees some limits on oil demand.

"It's likely that by the end of that timeframe, it would be that demand had softened. Then, the market would react to that softening, and prices could come off that $100 mark," Burkhard said.

Another scenario is that oil supply difficulties or perceived difficulties could offset any demand weakening, he noted.

"But if the level of supply anxiety stays roughly where it is today, and there is no worsening of that anxiety, then demand could begin to pull prices down after several months," Burkhard said.

Various investors available

Small independents must figure out how to best tap various funding sources while maximizing the value of their own companies.

"That can be rather daunting to small independents because they are not really financial guys. They are operators—good operators," said Schaeffer of GE Energy Financial Services, which structures its upstream investments as limited partnerships to help small independents purchase and develop oil and gas reserves.

Traditionally, large companies access the public debt markets such as bank

loans while small companies and start-ups require public equity as well. The two main types of private capital are equity and mezzanine or structured debt.

Forms of mezzanine financing include subordinated debt, project debt, preferred stock, and volumetric production payments.

"People who are willing to do mezzanine finance historically show up when the prices are good and disappear when prices aren't so good," Schaeffer said.

Numerous private equity options are available. Private equity providers invest in oil companies, often taking 50-80% ownership of a company. Schaeffer said the GE product does not require the small producer to dilute ownership.

It remains to be seen how long current levels of ample capital will remain available for oil and gas companies, Schaeffer said, adding that some financial providers not backed by big companies such as GE might not remain as aggressive energy investors.

"Word on the street is that some of the money available to producers for exploration and production financing is being pulled because some of the people who put that money up need liquidity due to subprime problems in other parts of their shop," Schaeffer said. "I have no crystal ball."

Upstream MLPs resurging

The US exploration and production industry is experiencing a resurgence of MLPs, which appeared during the 1980s. Most early upstream MLPs failed when oil prices dropped. Current MLPs appear likely to survive because of hedging, which enables producers to lock in prices for future production.

Raymond James & Associates Inc. analyst John Freeman of Houston believes upstream MLPs will be a major trend for several years. The trend is in its early stages.

As of Nov. 29, Raymond James listed seven upstream MLPs and said several other oil companies were in the process of establishing MLPs (see table). These companies are spinning off some of their producing assets into MLPs.

Cimarex Energy Co. expanded its drilling program in the Texas Panhandle Granite Wash through property acquisitions of 5,200 net acres for $36 million during the third quarter. Photo from Cimarex.

"E&P MLPs can significantly reduce their susceptibility to commodity price volatility by hedging a large portion of production, sometimes out 3-6 years, which is a stark contrast from the past," Freeman said. "Also, today's MLPs are equipped with higher-quality, longer-lived properties that are controlled for risk exposure with conservative maintenance capital budgets."

Private equity firm Quantum Energy Partners invested $15 million in a current MLP. Linn Energy LLC was formed in March 2003 and became a public company in January 2006.

Scott Soler, Quantum Energy managing director said, "The E&P MLP concept will get much bigger, although it will go through fits and starts."

"In the 1980s, over 100 MLPs were formed, of which 31 were upstream MLPs. We believe that E&P MLPs could again represent at least 30% of the MLPs in this era," Soler told participants of an Independent Petroleum Association of America seminar in August.

The MLP structure will continue to attract private equity because oil and gas fundamentals remain strong, offering investors above-market rates of return, he said.

Quantum Energy reports that during 1995-98, six energy private equity firms collectively raised $2.57 billion to fund overall energy investments. During 2005-06, seven energy private equity firms raised $16 billion to finance energy investments.

International financing

Some oil and gas companies receive financial support from multilateral financial institutions. International Finance Corp. (IFC), the private sector financing arm of the World Bank Group, backed BPZ Energy Inc. with its operations in Peru.

Other US companies IFC helped are Far East Energy of Houston with its operations in China; Improving Petroleum Resources of Irving, Tex., with Egyptian operations; and Toreador Resources Corp. of Dallas with its gas fields in Turkey.

Pan American Energy LLC signed a $550 million loan agreement with IFC, for development of Cerro Dragon oil field in the Golfo San Jorge basin in the southern province of Chubut, Argentina. IFC also may support Hunt Oil of Dallas and a number of partners in financing an LNG terminal in Peru.

Exploration and production MLPs

Existing
Atlas Energy Resources LLC
Breitburn Energy Partners LP
EV Energy Partners LP
Encore Energy Partners LP
Legacy Reserves LP
Linn Energy LLC
Constellation Energy Partners LLC

Proposed
Abraxas Petroleum
Encore Acquisition
Exco Resources
Petrohawk Energy
Pioneer Natural Resources
Plains Exploration
Quest Resource
Venoco Inc.
Whiting Petroleum
XTO Energy

Source: Raymond James & Associates Inc. after company releases

IFC promotes economic growth in developing countries by financing private sector investment, mobilizing capital in international financial markets, and providing advisory services to businesses and governments.

Lance Crist, IFC's head of oil and gas investments, said IFC's role evolves over time, and it represents a stable, long-term source of capital. The role of IFC varies on a project-by-project basis.

IFC sometimes is an equity investor and sometimes is a lender. It offers a large range of financial instruments from senior debt to quasiequity and equity investments and also works with banks worldwide to set up large syndicated loans for IFC clients.

"In times of high capital availability, we become more selective in working with more junior players who are less able to access international markets, and where we can support best practice environmental and social standards and meeting community development needs," Crist said. "We adjust our approach according to liquidity."

IFC is BPZ's second-largest shareholder, owning 10% of the company's stock. BPZ also relied upon private placements of common stock, primarily with institutional investors in the US and a few in Europe.

Recently, BPZ closed on $15.5 million convertible debt financing with IFC. This is the first tranche of a three-tranche IFC loan package worth an estimated $165 million that will enable BPZ to continue developing Corvina field.

BPZ's gas-to-power project involves the generation and sale of electricity in Peru along with gas sales into Ecuador for third-party power generation. This project is being done parallel with developing Corvina oil field and redeveloping Albacora oil field.

Manolo Zuniga, BPZ president and chief executive officer, said IFC's commitment and BPZ's production revenue helped BPZ grow without accessing equity capital markets.

Zuniga said the company's transparency and experience in monetizing gas has helped attract financing. Initially, the company was funded by a reverse merger transaction in 2004 that transformed BPZ into a publicly traded company.

"There have never been more options for the small producer to get financing, and it's never been more confusing.... That can be rather daunting to small independents."

—John Schaeffer, managing director and head of oil and gas investing, GE Energy Financial Services

BPZ has license agreements for oil and gas exploration and production covering 2.4 million acres in four properties in northwestern Peru. It also owns a minority working interest in a producing property in southwest Ecuador.

MegaWest and heavy oil

A start-up company is working to develop heavy oil in the US. MegaWest Energy USA Corp., a unit of MegaWest Energy Corp. of Calgary, used an OTC Bulletin Board company and a series of private placements for its initial funding.

"MegaWest emphasizes the redevelopment of large bypassed US heavy oil projects," said George Stapleton, president and chief executive officer. The company plans to use the best thermal recovery technologies developed in Canada.

During December 2006, the founders of what is now MegaWest bought Brockton Capital Corp. to establish a means to raise capital and acquire properties. Brockton—an inactive company that once sold keyboards for personal digital assistants—became a heavy oil company.

Brockton Capital entered into a series of letters of intent for property acquisitions. In February, the company changed its name to MegaWest.

Through December 2006 to March 2007, MegaWest organizers raised $34 million through three private placements and issued a number of share purchase warrants. If the warrants are exercised, Megawest has potential additional proceeds of nearly $23 million.

As of late November, the company had acquired four US heavy oil project areas with operatorship and ownership or the right to earn an interest in over 100,000 acres in Texas, Kentucky, Montana, Missouri, and Kansas. The property acquisition strategy continues.

MegaWest produces 100-150 b/d of 18-20° gravity oil through the Chetopa pilot project in Labette County in southeastern Kansas. MegaWest has 100% interest in Chetopa field where producing sands are analogous to Bluejacket and Warner sands in Missouri.

In October, MegaWest Energy USA closed a deal for over 33,000 acres in Montana for an estimated $2.25 million, including cash, shares, a carried work interest, and warrants.

Stapleton believes MegaWest can acquire heavy oil assets cheaper in the US than in Canada.

"The last 2-3 years, there has been tremendous interest in the oil sands of Canada," he said. Operators in Canada

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generally obtain leases at auction from the Canadian government, which maintains a database on all drilled wells.

Historical information about potential US leases is "spread out all over the place," Stapleton said, adding, "It's much harder to assemble the land position here. You negotiate with each land owner as to what you pay."

Bank loans in demand

Oil companies continue showing strong demand for bank loans, said Mark Fuqua, senior vice-president and manager of energy lending for Comerica Bank in Dallas.

The credit crunch, triggered by problems with subprime lending, probably prompted banks and brokerage houses to become "a little more reluctant" to take underwriting risks worth billions of dollars, he said.

"What happened was the subprime lending [problems across all types of business] hit a lot of the hedge funds and institutional players pumping a lot of capital into the market," Fuqua said. "Some financial institutions have seen a number of write-downs already.... Some of that probably bled over into the energy sector. I don't think there is any bank holding much in the way of losses in energy paper."

The availability of private equity drives growth for new companies, which translates into demand for bank loans, Fuqua said. For many start-ups, debt is still cheaper than private equity.

He said many start-ups are oriented toward exploration or development and don't have much of a reserve base yet with which to approach banks for reserve-based loans. "The market has been so super hot, particularly for anybody that can show some proved or probable reserves, that a lot of times these new companies sell quickly," Fuqua said. "They can sell out sometimes before there ever is any bank debt."

"In times of high capital availability, we become more selective in working with more junior players who are less able to access international markets."

—Lance Crist, head of oil and gas investments, World Bank's International Financing Corp.

Cimarex Energy Co. has relied upon conventional bank financing to expand its oil and gas exploration and production operations in the Midcontinent, Permian basin, and Gulf Coast.

Tom Jorden, executive vice-president of exploration, said the company funds its drilling program from its operating cash flow. Yearend 2006 proved reserves totaled 1.45 tcf of gas equivalent.

"Most of our properties are cash-flow machines. We reinvest that and are self funding," Jorden said. Third-quarter average production was 325.2 MMcfd of gas and 20,537 b/d of oil, Cimarex reported.

The Denver independent constantly is expanding its drilling program and optimizing production rates, he added. If a significant drilling opportunity for which Cimarex needed financing were to suddenly materialize, Jorden said the company would use bank debt.

He said the company is fiscally conservative and will continue to be so regardless of prices.

"Everybody looks good during good times, but a few of us remember when partners didn't pay their bills," Jorden said. "We are building a company that will weather the storm. We keep an eye on downside sensitivity."

Meanwhile, Comerica's Fuqua believes independents for the most part remain fiscally conservative despite high commodity prices and ample financing options. "They are using a lot of hedging," Fuqua said of producers. "I think overall most of these guys have been around the block a few times, and they don't want to overleverage their companies." ✦

US House bill taking shape with CAFE, renewables focus

Nick Snow
Washington Editor

US House Democrats are moving toward energy legislation containing stiffer automotive fuel efficiency requirements and a higher renewable fuel standard.

On Nov. 29 Industry lobbyists emphasized that details on the bill still needed to be finalized and remained sketchy. But they also told OGJ that there is a better-than-even chance the full House would soon consider the bill and that the Senate would take it up before adjourning in mid-December.

"This process is so closely held that it's very hard to know what [House Democrats] are doing until they release some kind of document," one lobby-

ist admitted. He said agreement looks closer on new Corporate Average Fuel Efficiency (CAFE) requirements than on renewable fuels and ethanol.

Another said House Speaker Nancy Pelosi (D-Calif.) wants to see an energy bill with an environmental component such as higher CAFE standards before the 2007 session ends. "Some people have told me, including a member yesterday, that she has quit talking about the killer provisions" that the Natural Resources Committee passed, he said.

"So the question is whether they have been dropped, or if they simply will be tucked into the bill later. Our best hope is for the first bill to go through without the unfavorable provisions so we can be ready to fight them in a second bill," the lobbyist said, adding that lawmakers will be under heavy pressure to find revenue sources for new programs.

Dingell on CAFE

The only official word came from Energy and Commerce Committee Chairman John D. Dingell (D-Mich.), who issued a Nov. 29 statement that said he remained committed to working with Pelosi and congressional leaders on legislation to increase automotive fuel efficiency standards. "We have made much progress, and I am optimistic we will reach agreement soon. It is my sincere hope that we pass an energy bill that includes a CAFE provision before the end of the year," he said.

A renewable fuels component could be more elusive, particularly since federal lawmakers seem significantly less intoxicated with ethanol made from corn in 2007 than they were in 2005 and 2006.

"You have the 'food and fodder' guys saying it's making their corn flakes and cattle feed more expensive. Meanwhile, the environmental people are concerned about emissions and about land going into corn production. It's not surprising that the enthusiasm for moving forward on it has slowed down," one oil and gas industry lobbyist said.

Still, a discussion draft of a new

WATCHING GOVERNMENT

Nick Snow, Washington Editor

Climate debate and gas prices

US gas utilities are closely watching the way global climate change legislation evolves because it potentially will affect the price of gas supplies.

"More and more electric utilities are using natural gas to generate power, which is a problem for local distribution companies (LDCs)," said American Gas Association Pres. David N. Parker. LDCs don't benefit, because power generators deal directly with producers. Increased demand simply leads to higher prices for gas utilities, Parker said during an AGA meeting with Washington energy reporters.

The climate change debate indicates more gas use in power generation, added David M. McClanahan, president and chief executive of CenterPoint Energy Inc. in Houston and AGA's 2008 chairman. "The energy industry has gone through a seismic shift. Climate change is coming at us, and the country is discussing how it gets and uses its resources," he observed.

"With the first new nuclear plant at least 15 years away—although we're on the cusp of building more—the electric industry is going to use more gas," McClanahan said. "A 20% increase is likely in the next 15-20 years if it expects to meet its customers' needs. That's going to put more pressure on supplies."

More domestic access

It's also why AGA and its LDC members would like to see producers get more access to domestic resources. "We'd like to see offshore areas on the East Coast open up. We need more access in the Rockies, and we need to bring gas down from Alaska," McClanahan said.

The US will need to import more LNG, although competition from other countries could be heavy, he added. "The shale plays in Oklahoma and Arkansas are good news. We're holding our own in production for the first time in decades."

AGA and its members were mildly concerned as 2007 began because Democrats were due to take control of Congress. "The election created a different environment," said Parker. With the year nearly through, it looks as if gas utilities were more successful dealing with regulators, particularly in states, than with federal lawmakers, he said.

Decoupling rates

"We have reduced consumption, but we're being asked to reduce it more. So we have to decouple prices," McClanahan said. "We have to get away from our companies' financial health being tied to the volumes they deliver." Decoupling is a regulatory step that treats a utility's recovery of fixed costs separately from volumes delivered.

Looking at proposed legislation, McClanahan expressed concerns. "Cap-and-trade could affect gas consumption. We want to be constructive, but we also are part of the solution," he said. "We have to work with the policy-makers and have a seat at the table."

His predecessor as AGA chairman, James T. DeGraffenreidt Jr., chairman and chief executive of WGL Holdings Inc., said gas utilities could address climate change by increasing attention to the proposals' benefits and detriments to their customers. ✦

House again considers oil and gas tax hikes

Tax increases on the US oil and gas industry are again under consideration in Congress.

Energy legislation expected to be introduced soon in the House of Representatives includes a tax package that would roll back oil and gas industry incentives worth an estimated $13 billion.

Also under discussion is exclusion of oil and gas companies from an imminent increase in a manufacturers' tax deduction, according to press reports.

The House earlier passed an energy bill that included essentially the same tax hikes on the oil and gas business and used proceeds to fund development of other energy sources.

Reconciliation of that bill with energy legislation passed by the Senate never occurred. House leaders recently revived work on energy legislation with a measure that initially excluded tax increases, which President George W. Bush has listed as one of several reasons to veto an energy bill (see related story, p. 26).

House energy bill contained provisions that the National Petrochemical & Refiners Association opposes. "It completely disregards the findings of virtually every study that has been released, from the National Academy of Science to the Organization for Economic Cooperation and Development to the Chesapeake Bay Commission. It also ignores every concern raised by a wide variety of other important organizations, including food producers, environmentalists, and economists," NPRA Executive Vice-Pres. Charles T. Drevna said on Nov. 27.

The new language also puts the cart before the horse by requiring a new study of impacts from increasing the renewable fuels mandate after it has been implemented, and by establishing mandates for cellulosic ethanol, biodiesel, and other fuels that aren't yet commercial, Drevna said.

"The proposed legislation also includes a new feature not included in previous drafts that sets a level for biodiesel, which has proven to be problematic at low temperatures. It also unfairly exempts existing ethanol facilities from a newly prescribed 20% reduction in greenhouse gas emissions," Drevna said. ✦

LNG Summit: LNG key to meeting world demand to 2030

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

LNG will lead pipeline supply as natural gas leads other forms of energy to meet growing global demand through 2030, according to Tom Cordano, president of ExxonMobil LNG Market Development Inc., Houston. Cordano presented ExxonMobil's view of global energy, natural gas, and specifically LNG to attendees of the 8th LNG Summit in Rome on Dec. 4.

World energy demand during 2005-30 will rise by 1.3%/year, or by about 120 million boe/d. Natural gas will increase at about 1.7%/year and faster than either coal or oil. For natural gas, this is slower than the 2.4%/year evident over 1985-2005. Asia and the Middle East lead the rest of the world's regions in that growth.

While natural gas demand in Asia will continue to see generally the same markets—Japan and South Korea especially—driving demand as in recent years, both North America (less Mexico) and Europe will see major advances in demand for pipeline and LNG-supplied natural gas.

North America, said Cordano, will see "rapid decline in supplies" of domestically produced natural gas. Europe is seeing a "rapid deterioration in existing supplies from Russia and the North Sea."

And, whereas in the past Europe was a relatively small player in natural gas demand, he said, it is becoming a major player.

Globally, LNG demand will reach about 500 million tonnes/year balanced among Asia, North America, and Europe in 2030 from a supply of a bit more than 100 million tonnes/year in 2005. Asia will dominate, requiring about 75% of that amount.

Driving the growth of LNG, said Cordano, have been technology advances in each part of the LNG value chain: larger, more efficient trains; larger, more efficient LNG carriers; and larger terminal designs.

But working against this growth in recent years have been rapidly rising costs of material and labor. Citing the Cambridge Energy Research Associates, Cordano noted the fly-up in project costs of nearly 80% 2004-07. ✦

Nigeria to impose domestic, export balance in gas use

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

Under a new presidential administration, Nigeria plans to impose greater balance between domestic gas and export projects, said Fabiyka Amakiri, group general manager for LNG and power in Nigerian National Petroleum Corp., speaking before the 8th LNG Summit in Rome on Dec. 4.

These plans, she said, are based on an assumption of "developing the nation as a modern economy and an industrialized nation."

As the first step in that shift, the country will ramp up domestic power production. Gas-fired electric power generation will be expanded to nearly 15 Gw by 2012 from none in 2007. Gas use for power will expand to more than 6 bcfd by 2011.

Combined gas demand for power generation and domestic industrial use will grow to more than 12 bcfd by 2013 from less than 2 bcfd in 2007.

For export, said Amakiri, by both pipeline and LNG, gas demand will reach more than 11 bcfd by 2014 from only 4 bcfd in 2007. To meet this level, NLNG Train 7 will come on line in 2012; both Brass LNG Train 1 and OKLNG Trains 1-4 will start up in 2013. All will reach peak production of 11 bcfd in 2014.

Combined natural gas domestic and export demand will peak at more than 16 bcfd by 2013. ✦

Shell contemplating greenhouse gas science

Paula Dittrick
Senior Staff Writer

Long-term storage logistics, support facilities for sequestration, public acceptance, and consistent regulations are just as critical as technology to making carbon capture and storage (CCS) a reality, said a scientist for Royal Dutch Shell PLC.

Charlie Williams, Shell chief scientist of well engineering and production technology, spoke with reporters via a web cast Nov. 15 in conjunction with Shell's International Science Symposium: Future Approaches in Subsurface Chemistry and Physics.

Thirty independent researchers and scientists from around the world met with 30 Shell scientists and technical experts for 2 days in Rijswijk, the Netherlands. The symposium was closed to the public.

Williams briefed reporters about the meeting, saying that specialized cooperative efforts are needed for CCS.

"The world's energy needs could increase by 50% in about 25 years," Williams said. "That is the equivalent of 100 million b/d of oil."

Shell believes maximizing oil and gas recovery rates from existing resources through enhanced oil recovery is one way to respond to rising energy demand. The company also is working to unlock new resources and provide cleaner fuels, Williams said.

"We have to have energy security through energy diversity," he said. "We're going to have to deal with CO_2 and the CO_2 footprint," he said. "You don't have to be a weatherman to know which way the wind blows."

CCS success factors

Shell's Williams said governments will have to accept the long-term liabilities for storing, monitoring, and verifying the location and any movement of stored CO_2.

In addition, governments must establish clear rules about accessing pore space. Currently, laws exist regarding extraction practices, but regulations have yet to be developed for major injection projects.

"There needs to be social acceptance of the whole idea," Williams said. "A lot of people get confused about the situation."

He also called for market-driven economics, noting that sequestration projects require massive investments.

"Managing CO_2 will require a spectrum of approaches, including CCS," Williams said. "We do have a lot of technology today...but government and society have a key role to play." ✦

Russia, Turkmenistan hasten Caspian pipeline work

Eric Watkins
Senior Correspondent

Russia and Turkmenistan have agreed to accelerate development of the proposed Caspian Gas Pipeline project following talks between OAO Gazprom Chief Executive Officer Alexei Miller, Turkmen President Gurbanguly Berdymukhammedov, and Deputy Prime Minister Tachberdy Tagyyev.

"Turkmenistan can start the implementation of the project earlier than it was initially scheduled," said Berdymukhammedov, referring to a declaration on the construction of pipeline signed May 12 by the Russian, Kazakh, and Turkmen presidents.

On completion in 2012, the pipeline will extend 510 km along the coast of

the Caspian Sea—360 km via Turkmenistan and another 150 km through Kazakhstan—and connect with the existing Central Asia-Center gas pipeline network on the Russian-Kazakh border.

The decision to accelerate construction of the line followed reports that Gazprom on Nov. 27 signed a contract amendment for the supply of gas from Turkmenistan.

Under the amendment, the price of gas in first half 2008 will be $130/1,000 cu m and will rise to $150 in the second half. Starting Jan. 1, 2008, the rate will be determined by a price formula based on market principles. Earlier Russia and Turkmenistan had agreed on $100/1,000 cu m for the period ending in 2009.

"The price formula that will come into force in 2009 will define the price of supplies under a long-term contract up to 2028," said Gazprom's Miller. "The Turkmen side expressed the readiness to increase the volume of gas supply to Gazprom, compared with the volume of the current year."

Following the announced price increase, Viktor Chernomyrdin, Russia's ambassador to Ukraine, said the increase will be passed on to customers in that country, the main recipient of Turkmen gas via Russia.

"Naturally, the gas price for Ukraine will also be changed. We do not know yet what price they agreed upon," said Chernomyrdin, who expressed surprise at the new rate. ✦

WATCHING THE WORLD

Eric Watkins, Senior Correspondent

Corruption feeds on oil

These days, it is very fashionable to unmask corruption in the oil and gas industry. Consider a recent conference in South Africa where international experts argued that oil has all too often proved a curse to Africa, greasing the palms of foreign firms as well as corrupt national leaders.

"Oil wealth is a mild toxin, much like alcohol. If you don't have a strong constitution, it tends to make you unstable," said Diarmid O'Sullivan of London-based Global Witness at the conference held by the South African Institute of International Affairs.

According to Alex Vines, head of the Africa program at Britain's Royal Institute for International Affairs, Angola is the world's leading importer of luxury vehicles even though some 70% of the population earn less than a dollar a day.

Mortality rate high

"Angola's budget is estimated to be $31 billion, yet its under-five mortality rate is the second worst in the world today," said Vines.

It's certainly not for the lack of available money, though, since millions of dollars in Angolan public funds lie frozen in Swiss banks, according to international NGOs Aktionfinanzplatz (AFP), Bern Declaration, and Global Witness.

In September, the three groups expressed serious concern over delays in returning $21 million in frozen public funds from Switzerland to Angola, and they called for more transparency to ensure that Angolan citizens have oversight over their use.

Of course, Angola is hardly the only country to be criticized for corruption in connection with oil and gas revenues. Look at the news about Turkmenistan, where former President Saparmurat Niyazov's opacity and 21-year misrule are said to have turned his gas-rich country into Central Asia's version of North Korea.

In April 2006, Global Witness published a report entitled "It's a Gas," which revealed Turkmen bank accounts at Deutsche Bank in Frankfurt, thought to contain a staggering $3 billion or more in oil, gas, and cotton revenues.

Accountability low

In theory these were state accounts, according to Global Witness. But in practice they were controlled by Niyazov himself, and none of this money was recorded in Turkmenistan's budget.

As Turkmenistan opens up its vast gas reserves to international investment, Global Witness wants the European Union to help the new government dismantle Niyazov's opaque system of Swiss bank accounts.

But that may be hard to do. While the EU might be interested in seeing such accounts dismantled, it also wants gas from Turkmenistan as a means of freeing it from dependence on Russia for energy.

Is it likely that the EU would insist on the return of Niyazov's ill-gotten gains? The $3 billion in past oil, gas, and cotton income means nothing to the EU—especially if inquiries about it were to embarrass the current Turkmen government into withholding supplies of its gas in the future.

Few of us care for corruption. But sometimes there are limits as to how far it can be unmasked. ✦

BP, Husky Energy to form oil sands partnership

Uchenna Izundu
International Editor

BP PLC will join Husky Energy Inc. in developing Sunrise oil sands field in northeast Alberta under a joint $3 billion investment plan, marking its entry into this sector for the first time.

In exchange, Husky will acquire one half share in BP's Toledo, Ohio, refinery, meaning that both will create an integrated North American oil sands business. Two independent 50-50 joint ventures will be formed from the equally valued assets to own and develop the businesses, BP said.

Under the agreement, BP will take one half share in Sunrise, which is expected to produce a peak of 200,000 b/d of bitumen by the end of the next decade with a 40-year production plateau.

The companies will use steam-assisted gravity drainage, a tested technology which heats the bitumen within the reservoir, allowing it to flow to the surface. "The bitumen will be piped to Hardisty, Alta., from where it will be transported via existing pipeline networks for refining," BP said.

Front-end engineering is expected to be finished in early 2008 and the field will be developed under a three-phase plan. Sunrise has been fully delineated by the drilling of 650 appraisal wells.

The deal represents a major development for BP in enhancing the security of North America's transportation fuels as the 155,000 b/d Toledo refinery will also be upgraded under a joint investment of $2.5 billion.

Currently the refinery has a capacity of 60,000 b/d for heavy oil, which will be increased to process 170,000 b/d of heavy oil and bitumen by 2015 following regulatory approval. It will be operated by BP as a US refining limited liability company.

Bob Malone, chairman and president of BP America, said the investments will increase clean fuels production by as much as 600,000 gpd.

Full regulatory approval of the proposed deal and final commercial agreements are expected to be completed in first quarter 2008, with a partnership effective date of Jan. 1, 2008. ✦

COMPANY NEWS

OMV increases pressure to acquire Hungary's MOL

Austria's OMV AG has launched legal proceedings in the Hungarian courts to remove the barriers to acquiring MOL Rt., upping pressure on the company's management to accept its $20.6 billion bid.

In other recent company news:

- Eni SPA has agreed to pay the higher price of £1.74 billion in cash for Burren Energy PLC, London, after Burren's board rejected two previous offers as too low.
- El Paso Corp. subsidiary Southern Natural Gas Co. (SNG) has agreed to acquire a 50% interest in a planned LNG terminal in Pascagoula, Miss.
- XTO Energy Inc. has set a capital budget for development and exploration of $2.6 billion for 2008 compared with its 2007 budget of $2.4 billion.
- Berry Petroleum Co. plans a capital budget of $295 million for 2008 compared with its 2007 capital budget of $320 million, which included $53 million for a Piceance acreage acquisition.
- The appreciation of Thailand's baht against the dollar has enabled PTT Exploration & Production PLC (PTTEP) to slash its capital expenditure in 2007-11 by 10% to 281 billion baht ($8.26 billion).
- Petroleo Brasileiro SA (Petrobras) has entered into an agreement with ExxonMobil subsidiary TonenGeneral Sekiyu Kabushiki Kaisha to buy an 87.5% interest in the Japanese company Nansei Sekiyu Kabushiki Kaisha (NSKK) for about $50 million.

OMV moves to buy MOL

OMV has asked for the state-imposed 10% voting limitation to be revoked and has called on the European Commission to say that MOL has violated the principle of free movement of capital within the European Union. OMV also views as an obstacle MOL's ability to remove a limited number of board members at a time.

OMV Chief Executive Wolfgang Ruttenstorfer has urged MOL's board to consider a formal offer—or face an extraordinary general meeting. "The financial benefits of the offer we would be prepared to make and the strategic rationale have received a strong reception from both OMV shareholders and the shareholders of MOL," he said. "We are again requesting that MOL's board exercise their fiduciary duties by removing the impediments, allowing OMV to present a formal offer which can be decided upon by the shareholders. Failing that, we are prepared to initiate an EGM."

OMV has repeated its desire to acquire MOL despite its rejection of the offer on the grounds that it is "value-destructive." OMV's offer this time is

dependent on the caps on voting rights being removed, and the cancellation of the 40% of the shares controlled by MOL's management. Legal proceedings have not changed its attitude to the takeover attempt, MOL said, because there is no "business rationale in a combination with OMV."

Any shares bought using MOL's resources should happen in a transparent and open manner, OMV urged, stressing that no economic rights should be attached to treasury and quasi treasury shares.

Last month, the EC asked the Hungarian government in a formal notice to explain "lex Mol," the new law where takeovers of companies in "strategic" areas can be blocked using a new set of defences.

If Hungary fails to show that is acting within the remit of EU law, the EC will launch enforcement proceedings.

Eni raises price for Burren

Eni's increased bid for Burren represents a 33.4% premium on the closing price of Burren's shares on Oct. 8. Burren's directors said they considered this deal to "be fair and reasonable" and plan to unanimously recommend it to the company's shareholders.

Eni Chief Executive Paolo Scaroni said Burren was an attractive acquisition because it would increase its production in the Congo. Both are partners in the M'Boundi field. "We will also gain a first foothold in Turkmenistan, a hydrocarbons rich country which has increasingly attractive growth potential," Scaroni said.

Korea National Oil Co. also has expressed an interest in Burren, raising the stakes that there may be a rival offer, but some analysts have signaled that they do not expect that to happen.

Scaroni told reporters in Venice that he expects to close the deal. "We're on the right track and there are all the conditions to make us optimistic we can bring the transaction to a positive conclusion," he said.

Burren dismissed Eni's latest offer as not reflecting the full value of its assets (OGJ Online, Nov. 26, 2007).

SNG buys LNG terminal stake

The $1.1 billion Gulf LNG project, which received regulatory approval early this year, includes construction of two, 160,000 cu m storage tanks with a combined capacity of 6.6 bcf; 10 vaporizers, providing a base send-out capacity of 1.3 bcfd; and 5 miles of 36-in. pipeline connecting the terminal to the Destin, Gulfstream, Florida Gas Transmission, and Transcontinental Gas pipeline systems.

The terminal is expected to be placed in service in late 2011.

SNG will operate the facility and will manage its construction. Gulf LNG has negotiated 20-year firm service agreements for all of the terminal's capacity.

Other partners in the Gulf LNG project are Houston-based investor Crest Group 30% and Sonangol USA 20%.

XTO sets E&P budget

XTO's 2008 budget includes another $400 million for the construction of pipelines, compression equipment, and processing facilities.

Next year XTO expects to drill about 1,160 wells (980 net) and perform 750 (600 net) workovers and recompletions. The company will target $125 million for exploration.

XTO has oil and natural gas properties in Texas, New Mexico, Arkansas, Oklahoma, Kansas, Wyoming, Colorado, Alaska, Utah, Louisiana, Mississippi, and Montana.

Berry's spending plans

For 2008, Berry Petroleum expects to drill more than 390 producing wells and is targeting 2008 production to average 30,000 boe/d. Total proved reserve additions are projected at 30 million boe.

The upcoming budget includes $173 million for heavy oil projects and $122 million targeting natural gas production growth.

The capital program assumes West Texas Intermediate crude prices of $70/bbl and Henry Hub natural gas prices of $7.50/MMcf, Berry said.

The company anticipates the capital expenditures will be fully funded through cash flow from operations.

PTTEP cuts spending plans

This year alone, the strong baht helped Thailand's majority state-owned PTTEP to cut investment to 66.73 billion baht from 74.51 billion baht.

PTTEP has revised its projection on the baht to 35/dollar from 38.

About 80% of its costs were in dollars, the currency in which the company booked all its revenues, according to PTTEP Pres. Maroot Mrigadat.

However, the 5-year plan does not include costs that will exceed $1 billion for developing gas-prolific Block M9 in Myanmar's Gulf of Martaban and Blocks 433a and 416b in Algeria.

PTTEP has engaged in 37 oil and gas exploration and development projects in the Middle East, Africa, and Asia, and it anticipates buying new gas and oil assets at home and abroad in a bid to increase reserves and capacity.

The company expects its 2008 petroleum sales to average 241,000 boe/d, up from a target of 188,000 boe/d this year as two major gas fields come on stream: Arthit field in the Gulf of Thailand and Block A-18 in the Malaysia-Thailand Joint Development Area.

Petrobras buys Japan refinery

The acquisition includes a 100,000 b/d refinery that processes light crude oil and high quality products, an oil and products terminal with storage capacity of 9.6 million bbl, three piers with capacity to receive product vessels of up to 97,000 dwt, and a monobuoy for very large crude carriers of up to 280,000 dwt.

Petrobras plans to use the terminal to boost its distribution of biofuels and to complement oil exports to Japan and elsewhere in Asia.

With this purchase, Petrobras will start refining operations in Asia for the first time. ✦

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CATASTROPHIC EVENT MODELING—2

Industry exposure and value at risk to storms in the Gulf of Mexico

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Offshore energy insurers have traditionally been defined by their willingness to take risk without relying on technical analysis to model or quantify their exposure.

The 2005 hurricane season in the Gulf of Mexico changed this perspective, and underwriters are now attempting to control their exposure to contingent losses through policy sublimits, exclusionary wording, and other restrictions on coverage.

In the second part of this two-part article, we quantify the losses to property damage in the gulf for historic weather events using the patented RMS Offshore Platform Model.[1]

Value at Risk measures indicate that the financial exposure of platform and rig assets in the gulf is on the order of $60-70 billion. Probabilistic scenarios from storm simulations indicate a 100-year loss estimated at $5.7 billion and a 250-year loss estimated at $7.5 billion for physical damage to platforms and rigs not including business interruption and operator extra expense losses.

Catastrophic modeling

The purpose of catastrophe modeling is to anticipate the likelihood and severity of potential future events so that companies can prepare for their financial impact.

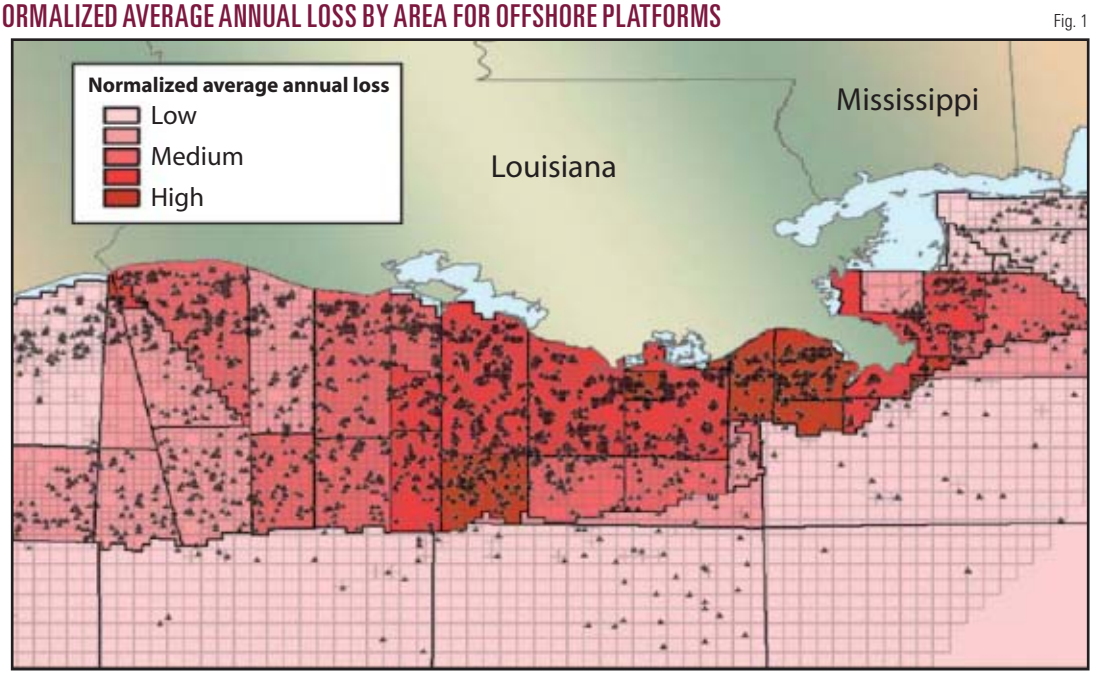
Physical damage, business interruption, and contingent business interruption losses depend on both subjective and objective inputs related to natural and man-made conditions. Probabilistic modeling allows the frequency and severity of potential hurricane losses to be quantified so that rational pricing and risk decisions can be made.

Design codes

Hurricanes have played a significant role in the design evolution of offshore structures, since the most significant learning and subsequent changes to standards has come from the performance of facilities during hurricanes.[2]

NORMALIZED AVERAGE ANNUAL LOSS BY AREA FOR OFFSHORE PLATFORMS

Fig. 1



In the early years of offshore development, structural integrity was largely the responsibility of the designers, who worked to a variety of standards drawn from coastal and onshore engineering experience. Structural engineers followed deterministic construction practices and dealt with uncertainty not by quantifying it but by incorporating explicit factors of safety in design procedures.[3-6]

Safety factors/design margins were used to account for unknowns known to exist, as well as those that are unknown, including construction loads and stresses, changes in loading assumptions, and uncertainties in environmental loads.[7]

Probabilistic methods in design and analysis began to be applied in the late 1960s.

The American Petroleum Institute's (API) Subcommittee 2, Offshore Structures, is responsible for recommended practice and specifications that govern the design, construction, and installation of offshore platforms.

The subcommittee unofficially began after Hurricane Hilda in 1964, and by 1969 the first API Recommended Practice 2A (API RP 2A) was issued.[8] In 1980, in the 9th edition of API RP 2A, environmental parameters and minimum deck height requirements for a 100-year storm, were defined.

In 1992, Hurricane Andrew triggered a need to review and upgrade design guidelines. Data from post-Andrew performance evaluations and insights from the Minerals Management Service (MMS) offshore inspection program prompted updates in the 20th edition of API RP 2A, including major revisions to the methodology of calculating design loads using the 100-year wind and wave criteria. The 21st edition of the API RP 2A uses consequence based design.[9]

The MMS will generally accept the risk of losing a structure where there is no threat to life or the environment. Owners may be willing to accept the risk on less important structures such as caissons and well protectors, but monetary considerations usually dictate increased capacity for structures with a high production rate, facilities that serve as a transportation or processing hub, and deepwater structures.

From an economic perspective, for a given probability of an extreme weather event, the investment required to avoid damage must exceed some fraction of the cost to repair the damage plus the expected business interruption cost. Trade-offs thus exist that attempt to balance the potential costs of damage and disruption due to a catastrophic weather event against the benefits of a more robust but expensive design.

Rig and structure inventory

The inventory of rig and structure assets in the GOM is constantly in flux, but for our purposes, we fix the time frame and assume the assets exhibit pseudosteady state behavior, balanced roughly between structure removal and installation, and rig entry and exit.

GOM STRUCTURE INSTALLATION AND REMOVAL, 1947-2006 Table 1

Water depth, ft	Caisson	Well protector	Fixed platform	Other*
Installations				
0-200	2,403	767	2,809	1
200-1,000	4	41	609	2
1,000+	0	0	6	34
Removals				
0-200	1,285	372	911	1
200-1,000	1	18	136	1
1,000+	0	0	1	1

*Includes compliant towers and floating structures such as spars, tension leg platforms, and semisubmersibles.

Rigs

Offshore drilling rigs are classified into two categories: mobile offshore drilling units (MODUs) and fixed units. Fixed units, also known as platform rigs, are drilling units that are placed on a platform. MODUs are further classified as bottom-supported (shallow-water) and floating (deepwater) rigs.

As of December 2006, there were 145 MODUs in the Gulf of Mexico, with 120 of the rigs contracted for service (83 jack ups and 37 semisubmersibles and drillships). A total of 55 platform rigs was available, with 28 in service.

In bottom-supported units, the rig is in contact with the seafloor during drilling, while a floating rig floats over the site while it drills, held in position by anchors or equipped with thrusters so that it can be dynamically positioned. Bottom-supported units include jack-ups, tenders, submersibles, and barges. Floating units include semisubmersibles and drillships.

Shallow-water structures

The basic size and function of an offshore structure result from the requirements of the development plan.

Caissons, well protectors, and fixed platforms are widely used throughout the shallow-water basins of the world. Caissons and well protectors protect the well bore from damage, while fixed platforms host the drilling rig and treatment facilities.

In the Gulf of Mexico are about 4,000 structures in less than 1,000 ft of water, but over time, the inventory of assets continually changes as fields deplete and structures are decommissioned and new fields are discovered and new infrastructure installed (Table 1).

Deepwater structures

Fixed platforms have a water depth limit of about 1,500 ft. Beyond this threshold, subsea completions and floating production systems are employed.

The objective of a deepwater structure is the same as a fixed platform, namely, to provide a safe, cost-effective, and stable workspace for operations. Deepwater structures are significantly heavier and more expensive than their fixed platform counterparts because of the environmental conditions and design requirements.

In a subsea completion, the valves and equipment used to control fluid flow are placed on the seafloor and are tied back to a fixed or floating facility.

Floating production, storage, and offloading vessels are the most popular deepwater development strategy worldwide, but in the gulf, spars, tension leg platforms (TLPs), and semisubmersibles have been the preferred development option because of the extensive pipeline network. The inventory of deepwater structures and subsea completions in the gulf is summarized in Table 2.

GOM DEEPWATER STRUCTURES, '06 Table 2

Construction class	Number
Fixed platforms	5
Compliant towers	3
FPSOs	0
TLPs	15
Spars, DDCV	15
Semisubmersibles	6
Subsea completions	156

Source: US Minerals Management Service

GOM EXPOSURE FOR STRUCTURES, RIGS BY CONSTRUCTION CLASS, '06 Table 3

Construction class	Percentage by value, %
Caisson/well protectors	6.5
Fixed platforms	48.6
TLP/Spar/CTs	24.1
MODUs	20.8

Source: Risk Management Solutions Inc.

Replacement costs

The replacement cost of a platform or rig is defined as the cost today to replace the asset with new property of comparable material and quality used at the same location for the same purpose. Replacement costs vary over time with the price of labor and materials and as a function of technology, inflation, location, and other factors.

Following underwriting practices, structure and contents (topsides) coverage are merged into a single property damage coverage. Structure type is specified, and for fixed structures, classified in terms of construction class. MMS and various commercial vendors maintain databases that describe the physical characteristics such as the age, type, location, and water depth of platforms, and the location, size, throughput, and capacity for pipelines. Commercial sources provide data on the location and specifications of offshore rigs.

The replacement costs for shallow-water structures are calculated based on typical expenses for each of the major components. Characteristics useful in the development of platform replacement cost include structure function (drilling, production), age, construction class (caisson, well protector, fixed platform), equipment inventory, production type (oil, gas, condensate), and production capacity. For the handful of deepwater facilities that exist in the gulf, reference to trade journal publications and company web sites were sufficient to estimate replacement cost.

The replacement costs for drilling rigs is based on data collected from Rigzone; ODS-Petrodata, Jefferies & Co., company web sites, and trade publications provided supplemental information. Due to the wide variability in the cost estimates reported, we found it useful to construct generalized rig replacement cost functions.

GOM EXPOSURE FOR STRUCTURES AND RIGS BY WATER DEPTH, 2006 Table 4

Water depth, ft	Structures	Rigs	Total value
		%	
<200	31.1	0.1	31.2
200-1,000	24.9	5.0	29.9
>1,000	23.2	15.7	38.9
All	79.2	20.8	100.0

Source: Risk Management Solutions Inc

GROUND-UP LOSS ESTIMATES TO PLATFORMS AND RIGS FOR HISTORICAL US STORMS—TOP FIVE EVENTS Table 5

Storm name	Year	Saffir-Simpson Category[1]	Ground-up loss,[2] $ billion
Katrina	2005	3	3.0
Rita	2005	3	2.5
Andrew	1992	3	2.3
Camille	1969	5	1.6
Not named	1915	4	1.5

[1]The category of storm is given by the Saffir-Simpson scale at landfall along the Gulf Coast. The actual category of storm, while passing through the Gulf of Mexico, is typically higher than at landfall. [2]Ground-up property loss is defined as loss before insurance. Losses portray what-if scenario results based on current offshore exposure and will be different from the actual losses for these events.
Source: Risk Management Solutions Inc.

Value at Risk

The value of gulf structures and rigs at the end of 2006 is estimated to range between $60 billion and $70 billion.

The value of gulf assets is estimated by construction class (Table 3), water depth (Table 4), and geographic region (Fig. 1). As rigs move into and out of the gulf, and as platforms are removed and new structures are installed, the total exposed value will change over time. Subsea completions and pipelines are not covered in the value assessment, and the development cost of a field, including the cost to drill and complete wells—which may range from 25% to 50% or more, of the total development expenditures—is not included.

We assume all structures and rigs are insured to their replacement value, whether active or idle. About 30% of the current inventory of GOM structures are idle,[10] and although idle structures are not expected to be insured to their full replacement cost, we did not discount this in our analysis.

Caissons and well protectors are the most prolific infrastructure in the GOM, but because they are minor structures without production facilities or drilling equipment, they only contribute about 7% of the total Value at Risk (VaR). Fixed platforms contribute nearly 50% of total property value, with deepwater structures (TLPs, spars, compliant towers) contributing 24% (Table 3). MODUs are estimated to comprise about 20% of the total VaR (jack ups 7%, semisubmersibles 10%, drillships 4%).

Across the water depth categories 0-200 ft, 201-1,000 ft, 1,000+ ft, structure exposure is roughly uniform (Table 4). Drilling rig exposure is concentrated in the deep water, where the most expensive and sophisticated rigs operate.

About half of the total exposure in the gulf is concentrated in six geographic regions, in Green Canyon 15%, Mississippi Canyon 11%, Garden Banks 5%, Eugene Island South 5%, Viosca Knoll 4%, and Eugene Island 4% (Fig. 1).

Physical damage

High wind speed, high wave height, and landslides are the main weather-related threats to offshore infrastructure (Fig. 2). Failure of primary structural components such as main braces, jacket legs, deck legs, and piles often leads to listing or capsized units. Deck inundation increases the horizontal load and overturning moment, resulting in the potential failure of structural members and collapse. Bottom-current loading or foundation failure may also lead to failure because of soil instability and mud slide conditions. Moorings on mobile offshore drilling units may fail, setting units adrift.

Vulnerability assessment is an estimate of losses due to physical damage, business interruption, and contingent business interruption. Physical damage is generally easier to model than business interruption and contingent business interruption, since the losses are localized, and vulnerability curves can be constructed based on historical data and physical models.

Historic storm events can be used to estimate the risk posed to an individual structure, a portfolio of platforms, regional assets, or the entire gulf inventory. For the current gulf inventory of structures and rigs, we examine the impact of historical storm events, leading to the ground-up loss estimates shown in Table 5.

Losses portray what-if scenario results based on the current offshore inventory and exposure levels and will be different from the actual losses for these events. Hurricane Andrew would be expected to cause structure and contents damage of $2.3 billion if it were to occur today; Hurricane Camille would cause $1.6 billion in property damage.

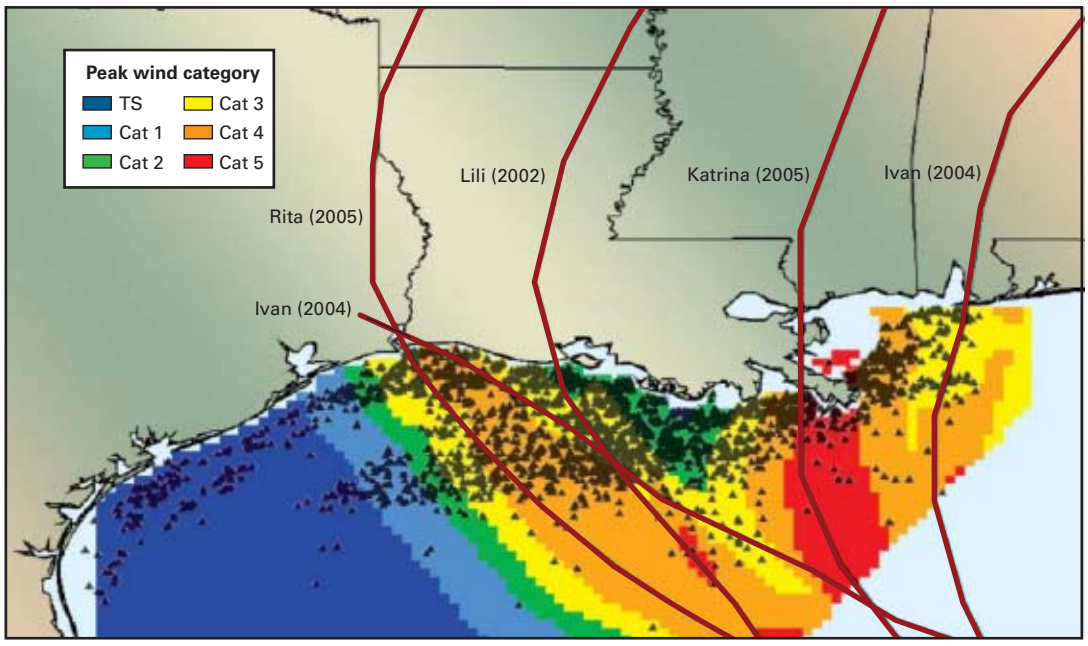
Offshore exposure

It may be interesting to speculate on what the loss today would be from another Hurricane Camille or Andrew, but since these events have a near-zero probability of occurrence, the more interesting question involves the expected losses from potential future events.

The annual exceedance probability

MAXIMUM PEAK WIND GUSTS OBSERVED IN 2002-05 HURRICANE SEASONS

Fig. 2



curve, defined as the annual probability of losing more than a particular amount, is a common way to convey loss information and to derive estimates of average and extreme loss.

Annual average loss (AAL) in the gulf for return periods of 100 and 250 years are estimated using the RMS Offshore Platform Model at $5.7 billion ($4.2 billion for structures, $1.8 billion for rigs) and $7.5 billion ($5.5 billion for structures, $2.3 billion for rigs), respectively. ✦

References

1. "Offshore Platform Model Methodology," RiskLink 6.0, RMS, Newark, Calif., 2006.

2. Wisch, D.J., "Observations of hurricane impacts on deepwater facilities," Offshore Technology Conference, OTC 18414, Houston, 2006.

3. Cox, J.W., "Standards and regulations. Planning and Design of Fixed Offshore Platforms," McClelland, B., and Reifel, M.D., eds., Van Nostrand Reinhold Co., New York, 1986, pp. 46-58.

4. Gerwick, B.C., "Construction of Marine and Offshore Structures," 2nd Edition, CRC Press, Boca Raton, Fla., 2000.

5. Graff, W.J., "Introduction to Offshore Structures," Gulf Publishing Co., Houston, 1981.

6. Mather, A., "Offshore Engineering: An Introduction," 2nd Edition, Witherby & Co. Ltd., London, 2000.

7. Wisch, D.J., "Adequate margins," Offshore Technology Conference, OTC 18333, Houston, 2006.

8. API RP 2A, "Planning, Design, and Constructing Fixed Offshore Platforms," American Petroleum Institute, Dallas, 2000.

9. Ward, E.G., Lee, G.C., Hall, R.A., Turner, W., Botelho, D., and Dyrrkopp, F., "Consequence-based criteria for the Gulf of Mexico: philosophy and results," Proc. of the 2000 Offshore Technology Conference OTC 11885, Houston, 2001.

10. Kaiser, M.J., and Mesyanzhinov, D.V., "A note on idle oil and gas platforms (idle iron) in the Gulf of Mexico," Ocean Development & International Law, Vol. 35, 2004, pp. 365-377.

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RMS' Americas climate hazard peril models. He has an MS in geology from the University of Michigan at Ann Arbor and a BS in meteorology from Pennsylvania State University.

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Falkland Islands

Rockhopper Exploration PLC let a contract to Wavefield Inseis for a site survey over the Ernest prospect in License PL024 in the Atlantic Ocean in the North Falkland basin.

Rockhopper is conducting an environmental assessment on PL023 and PL024 in advance of drilling.

Ernest is a relatively low risk, independent four-way dip closed structure in 160 m of water 100 km off the Falkland Islands. The robust four-way closure covers 2,880 acres within a total area of more than 6,000 acres. It is the lowest-risk prospect in Rockhopper's portfolio.

Israel

Zion Oil & Gas Inc., Dallas, said its technical staff recommended drilling the proposed Ma'anit-Rehoboth-2 well on the Joseph License to 17,700 ft to test the Permian Arqov formation.

Locating the well 800 m northeast of the Ma'anit-1 well, which Zion drilled in 2005, would put the well in an ideal position to penetrate all three members of the Arqov, which is strikingly similar to the Permian Khuff formation in the Persian Gulf region, said a company staff report. More than 20 Permian oil and gas fields have been discovered on the edges of the Arabian Plate to date, the company said.

Ma'anit-1 went to TD 15,482 ft, which may be within a few hundred meters of the Permian section (OGJ, July 5, 2004, p. 41).

Peru

Gran Tierra Energy Inc., Calgary, began field operations on undrilled blocks 122 and 128, which total 3.4 million acres in the eastern Maranon basin in northern Peru.

A 20,000 line-km airborne gravity and magnetic survey is under way, and results will be used to define exploration leads over which 2D seismic will be shot in 2008. Gran Tierra holds 100% working interest in both blocks.

GULF UPDATE—
Conclusion

Study updates elements, costs of Gulf of Mexico net trawling

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Site clearance and verification (SC&V) comprise the last stage of offshore decommissioning in which abandoned well and platform locations are cleared of all debris remaining from oil and gas activities. Net trawling uses a reinforced net assembly that is dragged along the ocean bottom to pick up debris.

This final of two articles on decommissioning oil and gas platforms in the US Gulf of Mexico presents descriptive statistics based on 308 net-trawling jobs performed between 2001and 2005, updating previous analysis covering 1997-2001.[1] (The first part appears in OGJ, Dec. 3, 2007, p. 44.) We summarize costs relative to structure type and water-depth categories and discuss factors that impact the cost of SC&V operations.

Federal regulations

In the US, federal regulations require that all wells and offshore structures in the Outer Continental Shelf be completely removed to a depth 15 ft (5 m) below the seafloor within 1 year after production on the lease ceases. After wells are plugged and abandoned and the structure is removed, regulations require that the site be cleared and verified "clear" by an independent third party.

A variety of techniques may be used to perform SC&V operations, but net trawling and diver survey are the most common in the Gulf of Mexico.

In diver salvage, divers identify targets and attach lift lines to the debris, and a crane on a surface support vessel lifts the debris from the water bottom and places it on deck for subsequent disposal on land.

Net trawling uses conventional trawling techniques with a reinforced net assembly to pick up debris. Net-trawling operations offer advantages in analysis relative to diver surveys because net trawling focuses exclusively on clearance and verification and the data are transparent and easy to interpret. Diving spreads typically perform many different services throughout decommissioning, and it is usually not possible to isolate clearance services from other activities, such as structure preparation, pipeline cutting, dredging, and others.

In 1981, the US Minerals Management Service introduced site-clearance regulations for the Gulf of Mexico Region. Current gulf OCS site-clearance activities are performed in accordance with the MMS GOM Region Notice to Lessees 92-02.

According to MMS regulations, all abandoned well and platform locations in water depths less than 300 ft (91 m) must be cleared of all obstructions present as a result of oil and gas activities.[2] Clearance requirements are specified according to well and structure type:

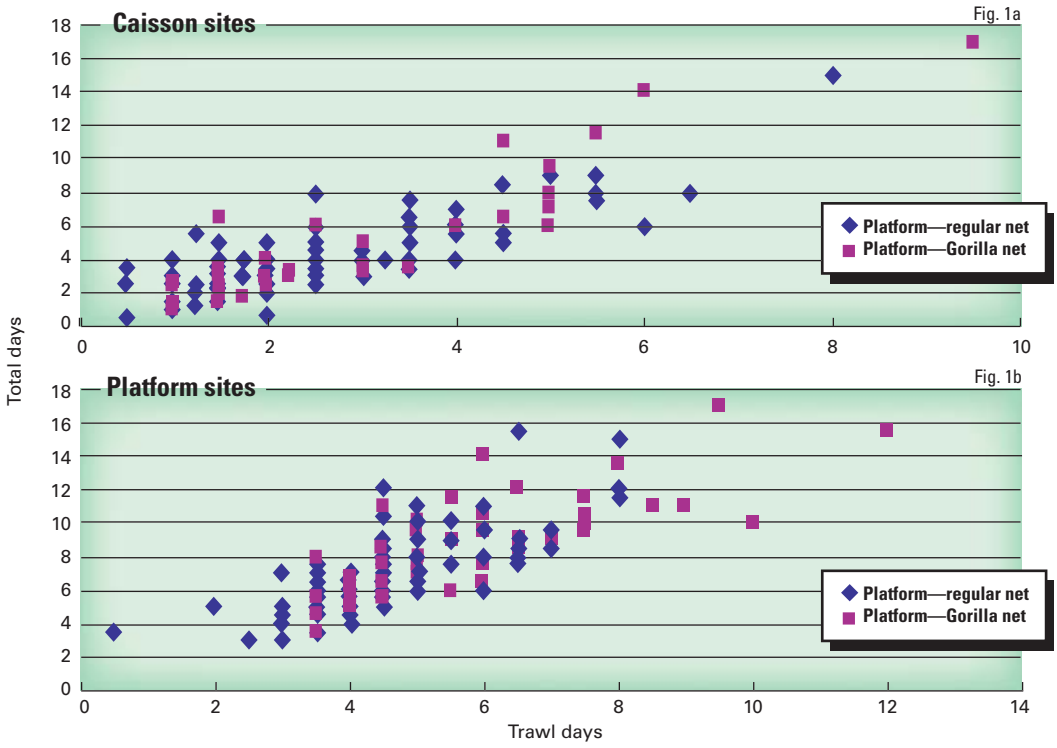
- Temporarily abandoned wells; working radius centered on the well.
- Delineation or exploratory wells drilled with a mobile offshore drilling unit; 300-ft (91-m) radius circle centered on the well.
- Single-well caissons and well protectors; 600-ft (183-m) radius centered on the well.
- Platforms; 1,320-ft (402-m) radius centered on the geometric center of the facility.

For temporarily abandoned wells, the operator must protect the apparatus with a net guard. To establish the effectiveness of the guard, standard shrimp-trawling nets are pulled over the device to ensure 100% coverage. For a delineation or exploratory well, clearance can be verified with a trawl or a 500-khz sonar search scan.

The MMS-preferred clearance-verification technique for structures is to drag a standard trawl net across 100% of the site in two directions with each pass 80 ft (24 m) apart. According to federal regulations, trawls should be

TOTAL SC&V JOB TIME

Fig. 1



picked up after 30-min drag time and all shrimp caught in the trawl released. In water depth greater than 300 ft (91 m), sonar scanning is permitted.

At the conclusion of clearance operations, a completion report must be submitted to the MMS detailing the removal operation and activities on each line and certifying that the site has been cleared.

Factors

The time and cost to clear a site and verify clearance depend on a number of factors that are uncertain and unobservable, including the amount, size, and type of debris present; site location; equipment available to perform the operation; supply-demand conditions for labor and service vessels; clearance and verification techniques used; and weather conditions at the time of the operation.

A site may require different salvage techniques or a combination of techniques to remove debris. Each site is unique, and operators make decisions on which technique to employ based on their experience and knowledge of the site conditions.

- *Structure type.* The structure type that previously occupied the site determines the area that must be trawled for clearance and verification. Federal regulations require clearance operations centered on the well or the geometric center of the facility, with radius determined by the well or structure type: temporarily abandoned wells (working radius), delineation and exploration wells (300-ft radius), single-well caissons and well protectors (600-ft radius), and platforms (1,320-ft radius).
- *Structure complexity.* Offshore structures perform a wide variety of functions, depending upon the field development requirements, and are constructed according to various tiers of complexity.

A structure that is unmanned and serves in an auxiliary role—a compression station, meter facility, or storage site, for example—is less complex than a manned drilling and production platform. Complex structures, especially development and manned production facilities, are likely to have more debris at the work site compared with unmanned facilities, caissons, and exploratory or delineation wells.

- *Clearance, verification.* Clearance may be performed with diver surveys, sweep assemblies, and heavy-duty trawl nets, electromagnetic and grappling devices, dredging buckets, or a combination of techniques.[3 4] Diver salvage and net trawling are the most common approaches in the Gulf of Mexico.

Clearance may be initiated with a survey to determine where debris are located, or net trawling may commence without performance of an initial survey, depending on operator preferences and conditions (expected or known) at the site.

If divers were previously deployed to clear the site or if the structure is a caisson or delineation or exploratory well, SC&V will usually be performed with a shrimper net. If preclearance operations were not performed or if the structure is a production or manned platform, clearance with a heavy-duty net typically precedes verification with a shrimper net.

Operations are performed sequentially and only for the verification survey does the area trawled have to cover 100% of the site.

- *Age.* A steel structure in salt water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will deteriorate from corrosion and wear, depending on the type and quantity of steel used, environmental conditions at the site, application of sacrificial anodes, and the manner in which hurricanes "use up" the fatigue life of the structure. Old structures have more time to gather and collect debris, and typically more targets will be identified and removed as a structure ages.

• *Location.* The location of the job where SC&V occurs influences the mobilization and demobilization times for arrival at the site. Most infrastructure in the gulf takes at most 12 hr to reach location; net trawling can begin almost immediately.

For most operations, distance from shore does not strongly influence costs. The distinction between near-shore and far-offshore activities can be significant, however, because the uncertainties associated with offshore operations are generally larger and of greater significance the farther offshore the activity occurs.

• *Water depth.* Water depth is often a primary variable in offshore construction activities because increasing water depth requires the size of the vessel to increase, reducing operational flexibility and increasing the cost of the operation. For net-trawling operations in water depths up to 300 ft (91 m), however, the vessels employed are relatively homogenous in terms of technical specifications.

Water depth does contribute to the time to set and retrieve netting and may be important if a given depth threshold is exceeded; water depth greater than 300 ft (91 m), for example, might necessitate use of remotely operated vehicles or manned submersibles to remove debris.

• *Exogenous conditions.* Weather conditions, mechanical problems, and trawler damage can affect the scope of SC&V operations and in most instances are unpredictable. Weather is a factor in all offshore operations, with extreme weather adversely affecting labor productivity and increasing downtime. Mechanical problems can be mitigated to some extent through preparation and proper contingency planning.

• *Strategic decisions.* Operators decide how a site is to be cleared, based upon experience and previous success of various techniques, technical information, equipment availability, and other factors. Cost is usually a primary consideration in decision making because operators want to fulfill the regulatory requirement in the most cost-effective and efficient manner.

NET-TRAWLING SC&V CONTRACT PARAMETERS: 2007*

Table 1

Contract parameter, unit	Parameter value, $1,000
K_1, $/day	4.5
K_{21}, $/event	2.4
K_{22}, $/event	4.8
K_{23}, $/event	1.2
K_{24}, $/event	2.2
K_3, $/incident	At cost
K_4, $/site	0.8

*For B&J Martin Inc.

NET-TRAWLING SC&V, GULF OF MEXICO: 2001-05

Table 2

Parameter, unit*	Caisson		Platform	
	Regular net	Gorilla net	Regular net	Gorilla net
TD, day	3.4	5.4	6.8	8.8
LD, day	2.2	3.2	4.4	5.8
SR, number	1.1	—	2.0	—
SU, number	0.8	—	1.7	—
GR, number	—	2.5	—	3.5
GU, number	—	2.5	—	4.7
N, item	4.7	10.8	16.3	30.2
WD, ft	69	72	124	93
AGE, years	18.7	24	13.4	27
TC, $/job	14,302	26,369	32,030	63,119
Number of jobs	139	20	92	49

*TD = Total number of days from dock; LD = Total number of trawl days; SR = Reparable shrimper nets; SU = Irreparable shrimper nets; GR = Reparable Gorilla nets; GU = Irreparable Gorilla nets; N = number of items collected; WD = water depth; AGE = age of structure upon removal; TC = total cost of job.

Service contracts; statistics

Net-trawling service contracts are typically written on a time and material basis with respect to the following elements: equipment and personnel ($/day), loss and damage ($/event), incidental ($/incident), and document preparation ($/site).

The equipment and personnel day rate covers the cost of the equipment and personnel to perform the service and includes the mobilization and demobilization cost to and from the dock site; all personnel, equipment, and supplies such as fuel, nets, lubrication, food, water, and navigation; and trawling services performed at the site.

A trawling vessel usually requires a four- or five-man crew for operation: a licensed captain, a surveyor, and two or three deckhands. The daily rate typically provides for 12 hr/day of trawling.

SC&V FOR CAISSONS: 2001-05*

Table 3

	2001	2002	2003	2004	2005	2001-05
Caisson—all						
Total cost, $	17,516	15,677	16,271	13,938	18,061	15,964
TC deviation, $	14,096	6,930	10,250	9,552	9,764	10,036
Percent	79.2	80.6	71.7	82.1	79.0	79.7
Deviation	17.4	13.7	20.0	14.3	14.9	16.3
Number of jobs	21	27	22	57	40	167
Caisson—regular						
Total cost, $	13,682	15,210	12,250	13,006	16,659	14,302
TC deviation, $	4,952	6,716	5,923	7,540	8,084	7,205
Percent	83.8	82.7	81.4	83.7	80.5	81.3
Deviation	10.4	11.7	11.0	12.0	13.3	11.6
Number of jobs	19	23	16	49	37	144
Caisson—Gorilla						
Total cost, $	53,934	18,358	26,995	19,646	35,357	26,369
TC deviation, $	24,511	8,615	12,092	17,228	14,054	17,069
Percent	36.2	68.8	45.6	72.1	60.9	56.7
Deviation	2.7	21.1	13.9	22.8	25.3	18.3
Number of jobs	2	4	6	8	3	23

*The percentage variable represents the portion of the total cost due to the time variation of the project and excludes the operational cost due to loss and damage of nets. TC deviation and percent deviation represent the standard deviation of the total cost and percent variables.

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

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SC&V FOR PLATFORMS: 2001-05*

Table 4

	2001	2002	2003	2004	2005	2001-05
Platform—all						
Total cost, $	45,966	44,502	32,694	48,872	42,480	42,834
TC deviation, $	25,994	34,111	13,686	23,776	20,892	24,390
Percent	71.1	75.0	75.7	72.7	75.5	72.3
Deviation	19.8	20.2	17.1	16.2	16.1	17.4
Number of jobs	25	25	24	23	44	141
Platform—regular						
Total cost, $	33,325	27,568	29,536	40,703	32,277	32,030
TC deviation, $	18,549	9,450	10,826	23,853	11,437	14,689
Percent	80.0	85.0	81.7	82.1	85.5	82.1
Deviation	14.5	8.2	11.1	11.2	8.8	10.3
Number of jobs	15	18	20	12	27	92
Platform—Gorilla						
Total cost, $	64,927	88,047	48,488	57,783	58,685	63,119
TC deviation, $	24,511	36,450	17,165	21,222	22,490	26,119
Percent	57.6	49.5	45.8	62.5	59.4	55.7
Deviation	19.7	19.7	5.3	15.0	11.5	13.2
Number of jobs	10	7	4	11	17	49

*The Percent variable represents the portion of the total cost due to the time variation of the project and excludes the operational cost due to loss and damage of nets. TC deviation and Deviation represent the standard deviation of the total cost and percent variables.

Nets gather and collect all sorts of debris during clearance operations and in the process may be lost or damaged. A separate loss and damage charge is expensed, depending on the type of net and if the damage is reparable.

Two types of nets are commonly used: standard shrimper nets and heavy-duty "Gorilla" nets. Nets are priced according to the cost of repair or if lost or irreparable.

Separate contract components cover boards, dummy doors, cables, chains, and buoys that are lost or damaged at the variable rate per incident. The company renting the vessel must arrange for disposal of trash collected from the operation. Document preparation and a closeout report on the trawling operation to MMS NTL 98-26 specifications are charged at a flat rate of per site.

Job specification is defined by the characteristics of the well per structure that occupied the site and the type of service requested by the operator. Although each job is characterized by a number of factors, only a few variables are usually recorded, such as the structure type caisson (C), well protector (WP), platform (P)), age (AGE) upon removal, and water depth (WD) at the site.

The total cost of job J, TC(J), is described in terms of the contract parameters as shown in the accompanying box.

• *Data source.* Data for 308 jobs performed by B&J Martin Inc. between 2001-2005 comprise the sample set. Jobs classified as "partially" completed or "incomplete" and those operations in state waters were excluded from analysis. To maintain the confidentiality of the data, operator identity is not revealed and only aggregate statistics are presented.

Total cost of each job was based on the price sheet for the year in which the job was performed. Price sheets describe the daily rate, loss and damage expense, meals and bunks, and report and track plot costs (Table 1). Reported job data included TD, GR, GU, SR, and SU.

Because the value of M was not reported, the cost excludes the expense of loss and damage or diver expense associated with lost boards, cables, chains, damage to rigging, or other exceptional events. Total cost also excludes the cost to dispose of trash. Daily rates start and end at dockside and standby rates at a lower basis apply to conditions as repair to outriggers or towing blocks caused by hang-ups.

Cost was estimated based on total number of days to perform the operation, number of reparable and irreparable nets, and the number of reparable and irreparable Gorilla nets. The job statistics were multiplied by the appropriate unit cost factors and summed, and the fixed cost of the track report was added. Costs are reported as current (nominal) dollars and are not adjusted for inflation.

• *Operational statistics.* The total number of days to perform SC&V services for platforms is roughly twice the number of days for caissons (Table 2). This result is partially explained by the greater amount of area required to be trawled for platform sites.

For all other things equal (site location, age, amount of debris present, water depth, for example), if the time to perform SC&V is determined entirely by structure type, we would expect that the time to perform SC&V on a platform would be about five times greater than a caisson because the trawling area for a platform exceeds the area for a caisson by a factor of about five.

All other things are usually not equal, however, and because many other factors play a role in the cost of the service a significant attenuation of the theoretical value results.

A trawling vessel normally operates for 12 hr/day; so the total number of days from dockside should exceed the total number of trawl days (LD)

SC&V COST-FUNCTION VARIABLES

$$TC(J) = K_1TD + K_{21}GR + K_{22}GU + K_{23}SR + K_{24}SU + K_3M + K_4,$$

Where: TC (J)= total cost of job J; TD = total number of days from dockside, GR = total number of Gorilla nets reparable, GU = total number of Gorilla nets lost or irreparable, SR = total number of shrimper nets reparable, SU = total number of shrimper nets lost or irreparable, M = total number of incidental events. The value of the parameters K_1, K_2, K_3, and K_4 are specific to the contract and vary over time, with

$$K_2 = \begin{cases} K_{21}, \text{Gorilla—net reparable,} \\ K_{22}, \text{Gorilla—net lost or irreparable,} \\ K_{23}, \text{shrimper—net reparable,} \\ K_{24}, \text{shrimper—net lost or irreparable.} \end{cases}$$

by a factor of about two. The impact of mobilization and demobilization to and from the site and variations due to the debris collected, weather conditions, time of year in which the operation is performed, again forces departure from this value. The ratio TD/LD ranges between 1.5-1.7 for the sample set (Table 2). Plots of TD vs. LD for caisson and platform jobs illustrate the data spread (Fig. 1).

The number of nets damaged when trawling across former platform sites is greater than caisson sites by a factor of about two (Table 2). Items collected provide some indication of the complexity of the task. Because the size, weight, and volume of the debris are not described—a tire and a 12-ft (4 m) long drillstring each counts as one item, for example—this statistic does not provide a useful descriptor variable.

For the most part, the average number of items collected as a function of structure type behaves as one would expect with old, complex, manned platforms often yielding the most debris.

Gorilla nets are often applied at old platforms. For the sample set, about 35% of platform jobs employed Gorilla nets, compared to less than 10% at caissons. It is unlikely that caissons will have debris that would necessitate use of Gorilla nets, while for platforms—depending on the age, function, and previous clearance activities—Gorilla nets are more commonly applied.

- *Total cost.* Tables 3 and 4 tabulate total cost of SC&V operations for caissons and platforms, according to jobs that employ only regular nets, jobs that apply Gorilla nets, and all jobs (regular and Gorilla net applications). The standard deviation of the total cost (TC Deviation) indicates the dispersion of the data.

The variable Percent reports the percentage of total cost arising from the day rate, which provides an indirect indication of the relative difficulty of the operation, because for difficult jobs the non time-varying cost of loss and damage will play a larger role in the total cost. The variable Deviation indicates the dispersion of the Percent variable.

The average cost to clear and verify a site previously occupied by a caisson is computed to be $15,964 (Table 3). Total cost varies across time and depends on the type of net used, with average costs ranging from $14,302 (regular nets) to $26,369 (Gorilla nets).

The value of the standard deviation is often one-half or more the average value, indicating significant variability across jobs. For platform sites, the average SC&V cost based on 141 jobs is $42,834 (Table 4). Net type is a key determinant of cost, with average cost ranging from $32,036 (regular nets) to $63,119 (Gorilla nets).

Personnel and vessel costs constitute the majority of the service cost for regular trawling. The average service cost for regular trawling exceeded 80% for both caissons and platforms, while for Gorilla net trawling, loss and damage play a more significant role and the day-rate percentage varied more widely, 36-72% for caissons to 46-59% for platforms. The cost of consumables (loss and damage) for Gorilla net jobs represents a significant part of the total cost reflecting more demanding trawling conditions.

- *Water-depth categorization.* Table 5 shows average clearance and verification costs aggregated according to water depth. Only a few jobs in the sample set were performed in water deeper than 250 ft (76 m); so cost entries for this category are more uncertain. A significant cost difference exists between caissons and platforms, but across water depth, the cost is reasonably uniform across both structure types. ✦

SC&V COSTS: 2001-05*

Table 5

Water depth, ft	Caissons		Platforms	
	Average	Std. deviation	Average	Std. deviation
	$		$	
<150	15,989	10,061 (166)	42,537	24,675 (100)
150-250	—	—	41,857	23,508 (33)
>250	11,728	— (1)	50,573	26,182 (8)
All	15,964	10,036 (167)	42,834	24,390 (141)

*Number in parenthesis represents the number of jobs in water-depth category.

References

1. Kaiser, M.J., Pulsipher, A.G., and Martin, J., "Cost of site clearance and verification operations in the Gulf of Mexico," ASCE Journal of Construction Engineering and Management, January 2005, pp. 116-126.
2. Department of Interior, Minerals Management Service, 30 CFR Parts 250, Oil and Gas and Sulphur Operations in the Outer Continental Shelf-Decommissioning Activities, US Federal Register, Vol. 65 (No. 131), 2000; pp. 41892-41903.
3. Pulsipher, A.G., ed. Proceedings of International Workshop on Offshore Lease Abandonment and Platform Disposal: Technology, Regulation, and Environmental Effects, New Orleans, Apr. 15-17, 1996.
4. Manago, F., and Williamson, B., eds. Proceedings: Public Workshop, Decommissioning and Removal of Oil and Gas Facilities Offshore California: Recent Experiences and Future Deepwater Challenges, Ventura, Calf., Sept. 23-25, 1997; US Department of the Interior, Minerals Management Service, OCS Report 98-0023.

The authors

Jimmie Martin Sr. has been involved in the oil and gas industry for 30 years as an owner and operator of offshore supply vessels. He was instrumental in implementation of site clearance legislation and invented the Gorilla net.

(Part 1 of this two-part series presents a biographical sketch for Mark J. Kaiser.)

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ABSTRACT DEADLINE: JANUARY 30, 2008

Saudi Aramco converts Yanbu fixed-bed reformer into CCR

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Saudi Aramco
Yanbu

Saudi Arabian Oil Co. (Saudi Aramco) successfully converted an existing 38,000 b/d fixed-bed reformer in its Yanbu refinery to continuous catalyst regeneration (CCR) operation. The revamped unit produces 75.5% platformate, which is a 100 RON clear (RONC) gasoline blending component.

This conversion was a major capital project that improved the reformer unit's reliability and efficiency by reducing the down time for catalyst regeneration. This unit conversion was the first revamped reformer-CCR unit for Saudi Aramco. The latest UOP LLC regeneration technology cycle max was used in this conversion.

This article discusses the conversion of the Yanbu reformer to CCR service, the technology used, lessons learned, and benefits gained.

The revamped reformer increased its yield to 75.5% reformate from 74.5% before the revamp. The project will increase the refinery's unleaded gasoline capacity by 8,000 b/d, and the unit's down time will be reduced. The CCR project's construction was completed in June 2006.

Based on an article that appeared in the Saudi Aramco Journal of Technology, Fall 2007, p. 49.

Yanbu refinery

The Yanbu refinery is a hydroskimming refinery on the west coast of Saudi Arabia. The refinery started up in 1983 with a capacity of 170,000 b/d to satisfy local demand for petroleum products.

Currently, the refinery processes 235,000 b/d of Arabian Light crude and produces about 295,000 b/d of petroleum products, including imports. Production includes fuel oil, low-sulfur diesel, two grades of premium gasoline, LPG, jet fuel, and butane.

The Yanbu process units include atmospheric crude distillation, LPG Merox, heavy straight-run naphtha (HSRN) hydrotreating, reformer and CCR, light straight-run naphtha (LSRN) hydrotreating, isomerization, saturation-gas concentration unit (SGCU), amine treating, and diesel hydrotreating (DHT).

Fig. 1 shows a flow diagram of the Yanbu refinery.

Fixed-bed reformer

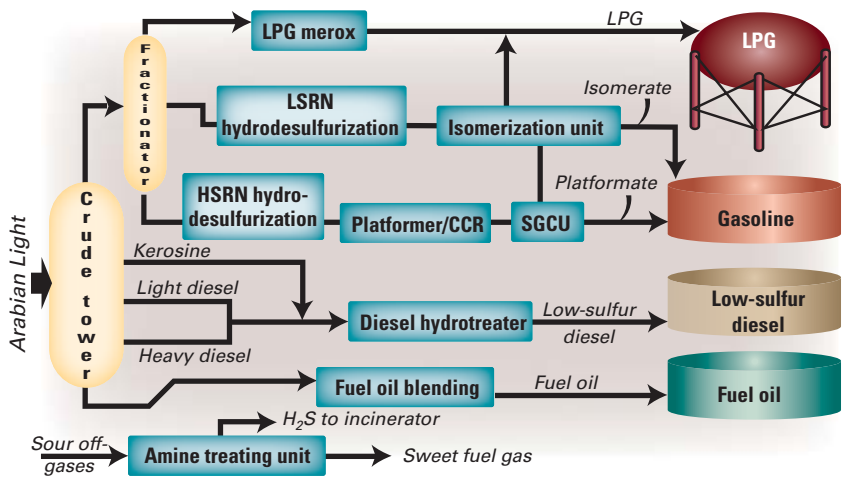
The Yanbu reformer was originally designed as a fixed-bed unit to process 35,000 b/d of HSRN and to produce 26,250 b/d of platformate at 94 RON. In 1995, the unit throughput rate was increased to 38,000 b/d and an operating severity of 96 RONC. The unit was shutdown every 6-8 months as part of a cycle to regenerate and restore the activity of the platforming catalyst.

The reformer originally consisted of three fixed-bed reactors that used UOP platforming R-56 catalyst. The unit reheat section has one charge heater and two interheaters to maintain the required reaction temperature at each catalyst bed. In addition, four vertical combined-feed exchangers preheat the charge feed and cool the last reactor effluent product platformate.

Two recycle gas compressors recycle the required hydrogen for the platform-

YANBU REFINERY CONFIGURATION

Fig. 1



ing reactions. Additionally, three make-up gas compressors feed hydrogen to the hydrotreating units. The unit has a gas-liquid separator to separate the rich gas from the product liquid platformate.

Fig. 2 shows the reformer fixed-bed process flow diagram.

Revamp objectives

In October 2002, Saudi Aramco approved a capital project to convert the old fixed-bed reformer to a CCR unit. Foster Wheeler performed the project proposal and detailed design, procurement, and construction was awarded to Snamprogetti.

The revamp's main objective was to increase the volume of the refinery's unleaded gasoline pool to help meet Saudi Arabian gasoline demands and to reduce imports. The additional 95 RON gasoline production specification amounted to about 8,000 b/d and the annual revenue will be in the millions.

The additional production reduces the requirement for expensive purchased blending components such as MTBE and allows for blending of higher volumes of LSRN, butane, and other lower-cost components into the gasoline pool. The revamp also increases the unit service factor because downtime for regenerations will be eliminated.

The revamped unit performs the same function—reforming heavy naphtha to high-octane reformate. The revamped CCR reformer produces 100 RON platformate at 75.5% C_5+ yield, 230.3 cu m hydrogen/cu m of feed, and at a 40,000 b/d charge rate. The old fixed-bed reformer production was 96 RON at 76% yield and 38,000 b/d maximum charge rate.

Continuous catalyst regeneration maintains RON, yield, and charge rate capability without the need for regeneration downtime.

Revamp strategy

After completing all construction and precommissioning activities, Saudi Aramco planned to shut down the old fixed-bed unit to perform the required modifications to change the unit configuration to CCR. Also during the shutdown, regeneration of the old catalyst was completed before starting the mechanical activities. Regeneration of the old catalyst was done to prepare the catalyst for dumping, screening, and platinum recovery.

The regeneration included only the carbon burn step without chloride injection, which saved about $12,000. The regeneration was completed successfully and the carbon level after carbon burn was 0.35 wt %.

After completing the regeneration, the old fixed catalyst R-56 was unloaded and screened for metal recovery. Then the old three reactors were demolished. About 256 mechanical tie-ins were completed during this shutdown, which took 28 days to complete.

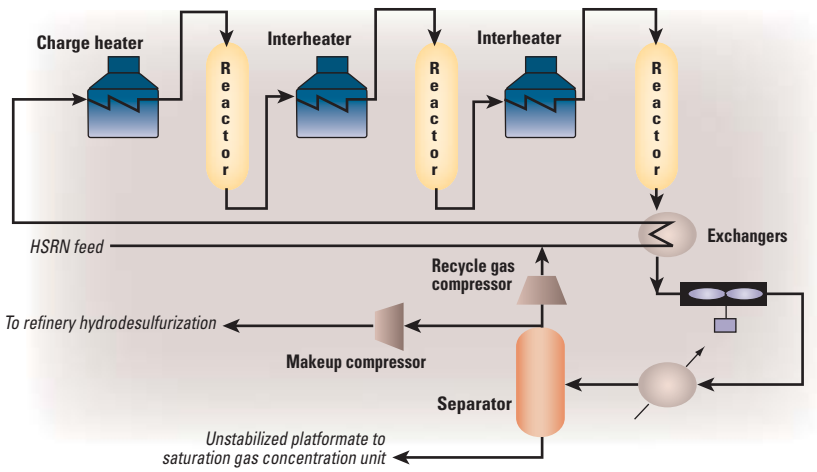
Revamped reformer

The Yanbu fixed-bed reformer unit was revamped to CCR on June 2006. The major changes for this conversion were:

- *Reforming stacked reactors.* The old series reforming fixed-bed reactors were replaced with three new reforming stacked reactors. The important feature of the stacked reactors is the low pressure drop to facilitate the catalyst movement from the reactor to the regenerator. The design pressure drop is 0.24,

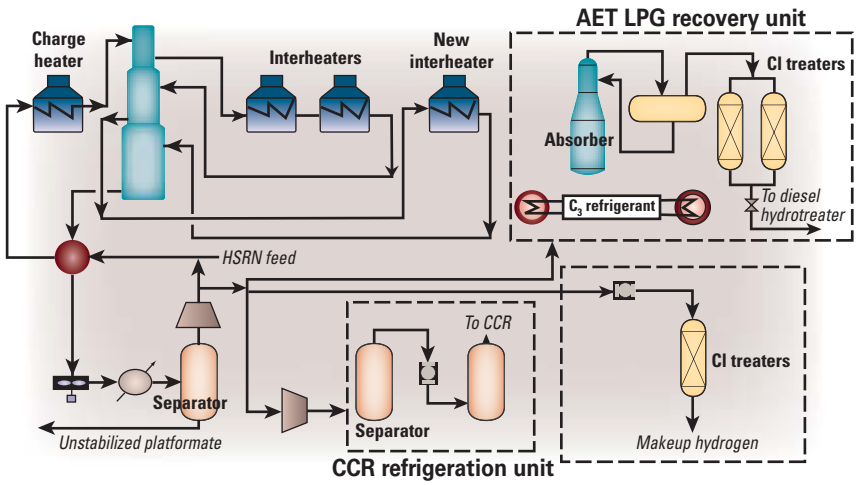
YANBU CATALYTIC REFORMER

Fig. 2



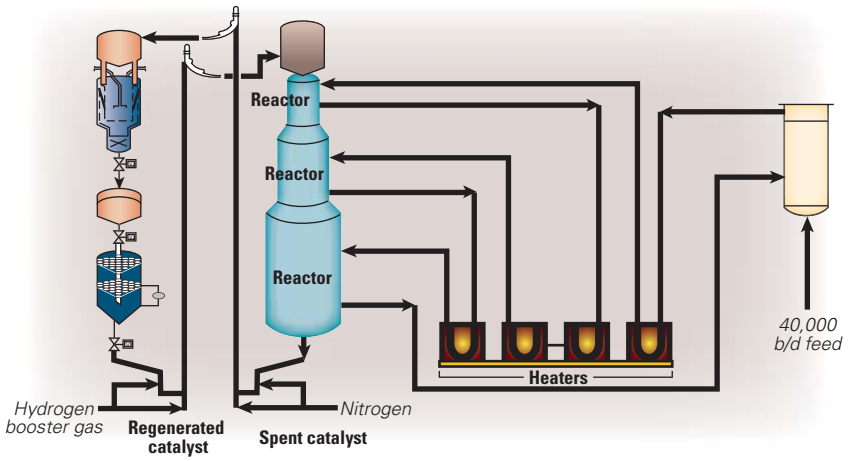
REVAMPED REFORMER

Fig. 3



REVAMPED REACTOR, REGENERATOR

Fig. 4



0.23, and 0.31 kg/sq cm for Reactors 1, 2, and 3, respectively.

• *Cycle max CCR.* The revamp incorporated a new UOP CCR cycle max model, which was the first unit of its type for Saudi Aramco. The CCR is designed to regenerate continuously the Platforming UOP-R234 catalyst at 100 % circulation rate or 2,000 lb/hr (907 kg/hr) to maintain the catalyst selectivity and activity.

• *New CCR refrigeration unit.* A new CCR refrigeration package was installed as part of the revamp. The objective of this unit is to increase the purity feeding the CCR reduction zone, lock hopper, and the regenerated catalyst lift line.

• *New waste-heat boiler.* As part of the revamp and to optimize the refinery energy savings, a new waste-heat boiler (WHB) was installed in the main duct of the reformer heaters. The WHB uses waste energy from the reformer heater flue gas to generate 150-psi steam at a design rate of 35 tons/hr with future spare capacity to produce 60 tons/hr.

• *Platformer heater modifications.* Saudi Aramco modified the reformer heaters to maintain the required heat duty to perform the platforming endothermic reactions. The existing second and third interheaters were combined and converted into one interheater to maintain inlet temperature to the second stacked reactor. In addition, a new heater was designed to maintain the reaction inlet temperature of the last reformer's stacked reactor. The revamped reformer unit has four total heaters including the charge heater.

• *Net gas system modification.* In a modification of the net gas system as part of the revamp, the old makeup gas compressors were reused to supply hydrogen to the CCR unit. Two new compressors were installed to supply the refinery hydrotreating's isomerization units with the required hydrogen.

• *AET LPG recovery unit.* A new Advanced Extraction Technology unit was designed as part of the overall revamp. The objective of this unit is to maximize LPG recovery from the reformer's net gas stream and increase the hydrogen purity of the net gas to meet the required hydrogen purity for the new diesel hydrotreater. The AET unit is designed to recover 98% LPG and increase the purity of the net gas to 89 mole % from 80 mole %.

REVAMP PERFORMANCE

Table 1

Unit type	Fixed bed	CCR
Capacity, 1,000 b/d	38	40
Severity, RONC	96	100
Yield, %	74.5	75.5
Gasoline production, 1,000 b/d	48	56
Steam production, tons/hr	0	35

• *Net gas chloride treaters.* Two new chloride treaters were installed on the makeup gas to the refinery's hydrotreating units and the net gas feeding the new diesel hydrotreater. These chloride treaters maintain a low chloride level (1.0 ppm maximum) in the effluent hydrogen gas to guard the downstream unit users from corrosion-related problems.

Fig. 3 shows the revamped Yanbu reformer reactor system. Fig. 4 shows the new CCR interaction with the reactor system.

Performance comparison

Table 1 shows a performance comparison between the reformer before revamp and after conversion to a CCR unit.

Lessons learned

During the revamp, we experienced several obstacles, but preparedness and teamwork effectively minimized their effect on the project. Here are the major lessons learned from the experiences of this revamp project:

• Implement a team approach and culture for other projects. Project stakeholders included project management team, Yanbu refinery, contractors, loss-prevention employees, inspectors, and other parties. Traditionally, the various stakeholders had different interests, lack of common objectives, lack of transparency, and inadequate planning and communication. This often led to project delays. Saudi Aramco initiated the team concept for this project, integrating all stakeholders into one overall team.

Benefits of the team concept included reduced project costs because everybody worked for the same company; shared and achieved common objectives; prepared planning and coordination for common activities such as the distributed control system, instrumentation, electrical, etc.; and it created a positive environment for operations.

• Use an automated mechanical completion acceptance system to manage exception items and mechanical completion certificate approvals.

Previous projects used a conventional manual hardcopy report system for tracking exception items. Yanbu projects have successfully used an automated system automatically to log, track, and close exception items.

The automated system helped us expedite exception item handling through an easy-to-use system, improve transparency, achieve project accountability, support focusing on project completion and closure, better track exception items, generate many variety of useful reports, reduce documentation, and save time.

- Ensure consistencies in vendor data. During commissioning, we observed that one of the equipment nameplate recommend using an oil-type material while the equipment document and manual referred to different material types. The team contacted the vendor, which confirmed that the manual was correct. Equipment nameplate and manuals should match each other.
- Consider inspecting equipment. One of the vessels failed during startup. The investigation revealed that there was no requirement governing the internal inspection of vessels. We learned that the vendor and plant owner should inspect vessel interiors to avoid unexpected problems. ✦

The authors

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Rabea M. Al-Saggaf is a process engineer at Saudi Aramco, Yanbu. He joined Saudi Aramco in 1996 and has 10 years of refining experience. He holds a BS in chemical engineering (1996) from King Abdul Aziz University, Jiddah.

Controlled emergency shutdown procedures aid crude line safety

Tobias Walk
ILF Consulting Engineers GMBH
Munich

Pipeline control center operators need controlled operational emergency shutdown procedures to prepare for an emergency situation. The procedures contain the particular operational measures for each location of the pipeline system to be initiated using remote control (supervisory control and data acquisition or other control system). Integrating these procedures in a geographical information system data warehouse provides a combination of information sources for a state-of-the-art control center tool based on a modern information technology infrastructure.

Even if the operator never executes these procedures, they provide a good training tool for control room operators, demonstrating the proper bases on which to initiate the correct emergency procedure in a timely manner.

Calculating theoretical oil spill quantities for each pipeline section (based on the total drain down volume of the isolated block valve sections), provides the initial basis for a COESD procedure. The COESD section plan then graphically presents the calculated results with the pipeline elevation profile. The COESD section plan and available remote control devices (block valve stations, pump stations, relief tanks) define the COESD procedures to further minimize a potential oil spill in an emergency. Integrating COESD section plans and procedures within sophisticated GIS systems provides main control center operators with straightforward access to these procedures.

Background

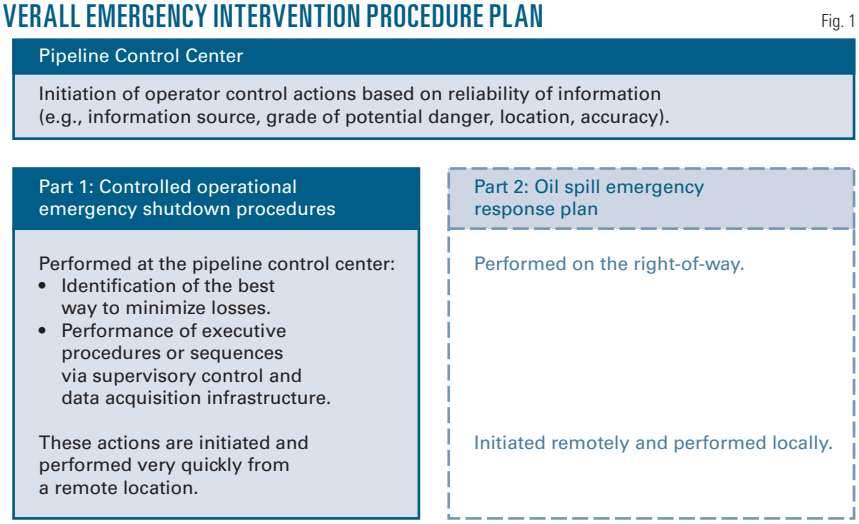
COESD procedures form the first part of the overall emergency intervention procedure plan mandatory for every oil pipeline. The COESD procedure contains mainly remote-controlled operational actions. The second part consists of the oil spill emergency response plan, which lies outside the focus of this article.

Fig. 1 provides an overview for the organizational implementation of COESD procedures.

The release of COESD procedures has priority over the release of an oil spill emergency response plan. The release of both plans, however, may occur simultaneously so long as this does not delay the COESD.

OVERALL EMERGENCY INTERVENTION PROCEDURE PLAN

Fig. 1

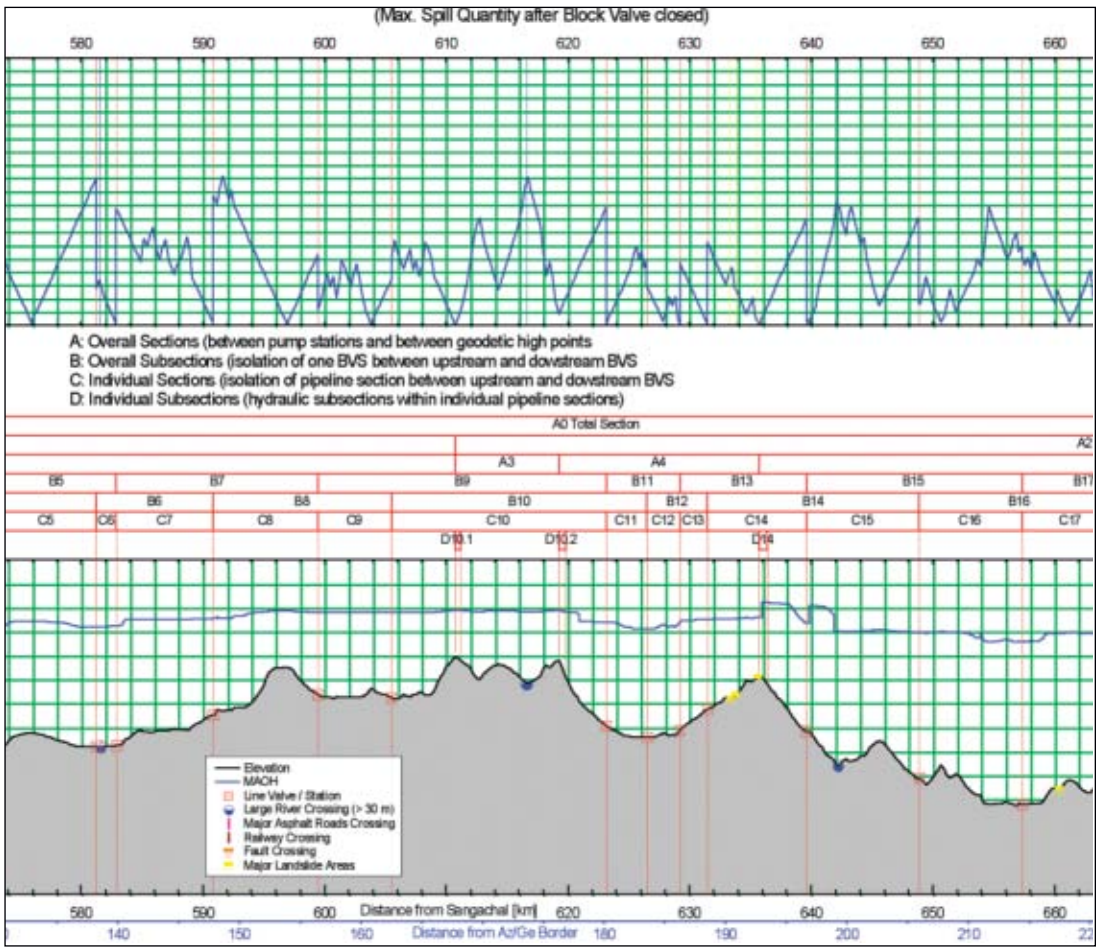


Shutdown criteria

The two general classifications of shutdown include a normal (operational) shutdown and an emergency shutdown.

A normal shutdown occurs upon either operational instructions or detection of failure or faults on safety equipment. A COESD occurs upon detection of leaks or suspected leaks or in case of danger or potential damage.

Emergency shutdowns usually cause higher operational load variations, subsequent operational faults, and longer downtimes, leading to higher costs than normal stops. Management should therefore develop clear-cut operating instructions enabling the responsible operator to correctly decide if an emergency shutdown is justified.



This screen shot shows the controlled operational emergency shutdown section plan for part of the Baku-Tbilisi-Ceyhan crude pipeline, noting both pipeline sections and subsections as well as mechanical components and key geographic features (Fig. 2).

Leak identification

Human beings on any location along the ROW or in its surroundings can visually identify a leak, or the activation of the safety equipment in the control centers can alert the operators to a leak. A modern data warehouse system can combine various information sources and support the control center operator. The following paragraphs provide a listing of various specific identification mechanisms.

A company's own personnel can inform the control center, which then implements all further measures as appropriate in accordance with its overall emergency intervention procedure plan. The staff's familiarity with the pipeline system and its potential risks allow reliable identification of the pipeline marker or pipeline crossing from the control room.

A person outside the company can inform the pipeline control center or a public emergency call center. The control room operator then must verify if the problem is related to the pipeline system and cross-check whether the reported location matches a location along the pipeline system.

A leak detection system can also identify a leak. The typical LDS software package facilitates and integrates various leak detection monitoring methods to identify different kinds of leaks (small, midsized, or large leaks; slowly or rapidly developing leaks) across several operational scenarios (steady state, transient, or shut-in). Comparing the results of various algorithms can also validate a given alarm and exclude false alarms. Confirming alarm leaks also requires the control center to closely monitor and analyze all other pipeline systems presenting relevant information.

Leak locating

When a leak is first identified, it is unlikely its precise location will also be instantly known. For example, a person external to the company reporting a leak would likely refer to the neighboring villages, roads, rivers, or railways and would not normally be in a position to cite a pipeline kilometer or identify the appropriate valve stations.

Even when a leak is first detected in the control center, the leak-detection system may not always be able to sufficiently define the leak position immediately.

COESD-Section:	GC14 – GB15		COESD-Code:
• From:	GC14	km 590.85	C4.8
• To:	GB15	km 599.45	
Worst Case Spillage Quantity	5500 m³		

COESD-Procedure:

1.a) Stop all pumps of PSG2

1.b) Close block valves GB12

1.c) If

- the pressure at block valve GB12 decreases below 77.9 bar or
- the pressure at block valve GB15 decreases below 32.8 bar or
- the pressure gradient between the block valves GB15, GB16 and GB17 reverses

stop all pumps of PSG2 and close block valves GB12 and GB15

1.d) Decrease set-point (PC) at the inlet of PT1 down to the minimum (PCL 7 bar) and continue pumping with PT1 with the max flow rate possible, until the pumps suction pressure reaches the minimum of 2.5 bar

2. Close block valve GB15

3. Monitor pressure development within section C4.8 *(notice possible effect of check valves GC13 and GC14)*

This COESD procedure page also comes from the BTC crude line and details what control-room actions should be taken under what conditions (Fig. 3).

This is especially the case if the volume-mass balance method reports a difference in quantity and no other leak detection system alarm triggers at the same time. Provided it is not a false alarm (an instrumentation failure, faults in transmission, or errors evaluating the measured values), the leak could be at any point between the two mass metering devices.

Drafting a COESD procedure therefore requires accounting for any uncertainty about the location of an existing leak.

The COESD section plan (Fig. 2) provides an overview for identifying the proper COESD procedure. The section plan divides a pipeline system into main sections (A, B, C, etc). These main sections extend between the pump stations, pigging-relief stations, and receiving terminals.

Each number (x) after the letter designates other subsections within the plan and allows greater precision in determining a location along each section.

Subdividing the Ax sections into Ax.y sections between geodetic high points and other points of technical interest (e.g., pigging stations), allows for still greater accuracy. Further dividing each Ax section into Bx.y section isolates blocks or check valves along each section.

The first number (x) of the Bx.y sections is always in line with the overall Ax section, identifying the location, while the second number (y) identifies the sequence.

Subdividing each Bx section further into Cx.y sections, isolates pipeline sections between the next upstream or downstream block or check valves.

The first number (x) of the Cx.y sections is always in line with the overall Ax section, identifying the location, while the second number (y) identifies the sequence.

The COESD section plan also divides the pipeline into Dx.z sections based on hydraulic criteria and on the possibility of draining, using existing mechanical connections, into mobile storage equipment or using mobile pumps to transfer around closed block valves to a neighboring section. The second number (z) of a Dx.z section is in line with the sequence number (y) of the superior Cx.y section.

The section plan also shows the theoretical oil spill quantities. Total drain-down values of the isolated block-valve sections provide the basis for these quantities. The drain-down values would remain valid in case no COESD procedure were carried out in time or at all. The section plan also calculates the maximum possible spill quantity for each section and each elevation point.

The COESD section plan subdivides A-sections into B, C and D-sections (Fig. 2). The control center operator should execute the dedicated COESD procedures as quickly as possible (Fig. 3).

Figs. 2-3 show COESD as applied to the 1,765-km, 34-46 in. OD, Baku-Tbilisi-Ceyhan crude pipeline, which began operations in 2006.

The subdivisions allow the responsible operator, depending on the level of information available, to identify pipeline sections of interest, while automatically ensuring maintenance of optimum operating parameters. The section of interest is always the smallest section the section plan can identify.

If the operator gains additional information at a later stage and knowledge of the actual leak location is improved, the operator shall immediately take necessary corrective actions to reduce the previously selected pipeline section.

COESD implementation

In the event of an alarm, the opera-

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

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

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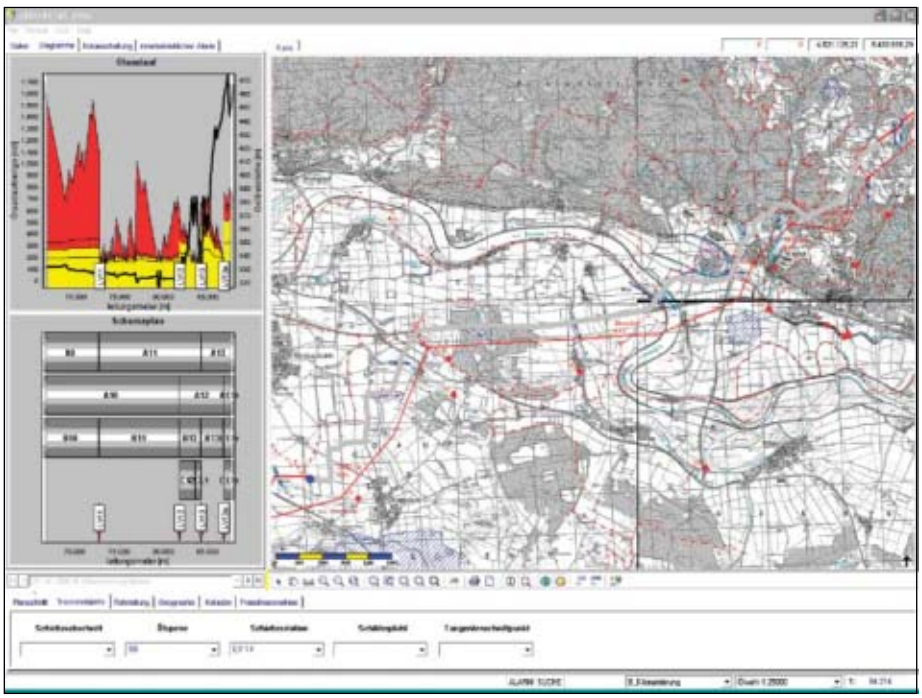
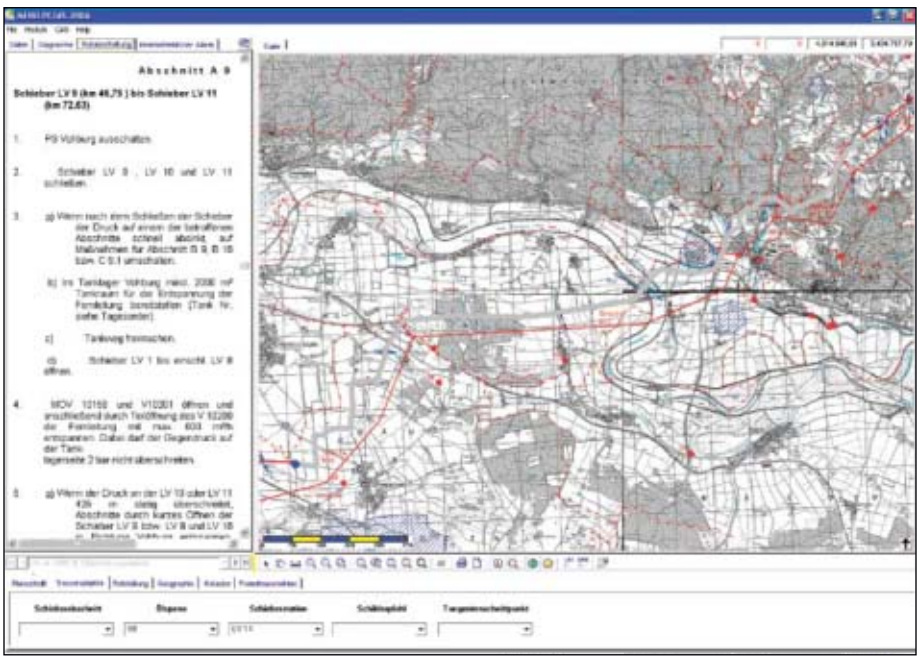




Screen shots from the operating COESD system on the Mid-European Crude Oil Pipeline display first a COESD section plan incorporating information from a geographical information system data warehouse and second the COESD procedure that corresponds to the displayed section of pipeline (Figs. 4-5).

tor identifies the section of the pipeline in the overview section plan (Fig. 2) in which he can already locate the leak on the basis of initial information or suspicions. The section codes shown in the overview section plan for the sections on which damage is suspected describe the particular measures to be taken. These measures are defined in the catalogue of COESD procedures to be executed (Fig. 3). Depending on pipeline length and elevation profile the number of individual COESD procedures could easily reach 400 or more.

The individual sections of the pipeline covering the threat location, as identified on the section plan, should always be as short as possible.

Besides the code number in the COESD procedure heading of each section, the catalogue of COESD procedures also shows the type of station or important hydraulic points and their location in total pipeline kilometers for the beginning and the end of each section.

The procedure heading also shows the worst-case oil spill within sections B, C, and D. The actual scale of any spill depends on the exact location of the leak.

When completing measures for individual sections described in the catalogue of COESD procedures to be executed, operators must adhere strictly to the specified control sequence.

COESD example

In order to assist the pipeline operator in a timely manner, especially in emergency situations, COESD procedures should be easily accessible within a modern electronic database. The database tool should provide quick access to relevant COESD section plan drawings as well as to the identified COESD procedures. Combining the COESD procedures and section plans with other information sources and databases inside a GIS data warehouse provides the control center operator with a powerful tool.

A simple Microsoft Office database application can provide this functionality early in a project (e.g., during pipeline commissioning or line-fill activities). During operation, however, the database must also support cross-references with other geographical pipeline information (e.g., maps with pipeline markers, right-of-way records, a land registry database, etc.), requiring use of a modern GIS system.

The pipeline-specific requirements of the operator typically guide design of this kind of system. Figs. 4-5 show screenshots from the 348-km, 28-in. OD, Mid-European Crude Oil Pipeline,

running between Vohberg, Germany, and refineries in the Czech Republic. MERO used ms.GIS software to implement COESD procedures within a GIS data warehouse system.

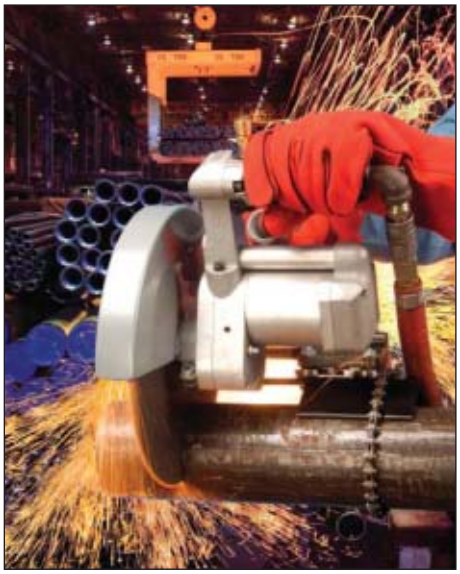
The right side of Fig. 4 shows a map for a selected pipeline section. The bottom part of the display shows various filter options available for a quick pipeline section allocation, depending on information available to the control center operator. The left side shows the COESD section plan provided for the selected section.

Selecting the relevant COESD procedure occurs directly within the COESD section plan. The software presents the COESD procedure to the operator on a separate register tab as a part of the left frame (Fig. 5). ✦

The author

Tobias Walk is deputy head of the department of SCADA & automation at ILF Consulting Engineers GMBH, based in Munich. Recent projects of note include design of the automation concept for the East Siberia Pacific Ocean crude oil pipeline system (2007-present) and design, construction, and commissioning of the Baku-Tbilisi-Ceyhan crude oil pipeline system (2001-06). Walk studied electrical engineering and information technology at the Technical University of Munich, with special focus on automation and control systems, graduating in 1996.

Equipment/Software/Literature



Bracket, saw available for oil field tubulars cuts

A chain-mount bracket that attaches a universal air-powered saw to pipe and bar stock quickly for applications requiring multiple cuts in the shop or on the job site is available for oil field use.

The firm's single cut bracket securely clamps the company's APS-438 air powered saw onto a pipe or bar stock as large as 4 in. OD and allows it to make square cuts with ±1/16 in. accuracy. Operating on 90 psi air, this saw has a 3 hp motor, includes a standard grease fitting, safety throttle handle and relief valve, and uses either 10 in. or 12 in. fiberglass reinforced abrasive blades. The bracket and saw create a chop-off saw that is superior to reciprocating hacksaws, the firm says. The fiberglass reinforced blades are capable of cutting stainless steel, inconel, and other hard materials.

Source: **ESCO Tool,** Box 530, Medfield, MA 02052.

New velocity modeling methodology

A new velocity modeling methodology helps improve the quality and reliability of seismic data for greater accuracy in subsurface imaging.

US Patent No. 7,280,918 was issued Oct. 9, 2007, to the firm listed below for methods and systems used to combine seismic data and basin modeling data. The proprietary technology allows development of more precise earth models for the identification of prospects, well planning, and drilling operations.

The company's patented velocity modeling methodology improves seismic data reliability by fully integrating basin geopressure modeling, geostatistical analysis, and seismic reprocessing, the company notes. More accurate pressure prediction in areas of poor velocity data quality and improved well placement and target qualification are included among features.

The geologic modeling integrates pore pressure, clay compaction, and compartment pressure modeling to produce synthetic velocities and pressure stratigraphy surfaces that better constrain seismic imaging, the firm points out.

Source: **Knowledge Systems Inc.,** One Sugar Creek Center Blvd., Suite 1100, Sugar Land, TX 77478.

Services/Suppliers

InterAct

Norwich, UK, has announced that Shahrokh Mohammadi has been named vice-president of operations. Mohammadi has 23 years of oil industry experience, including 14 years with JP Kenny. He has a doctorate in petroleum engineering from Heriot-Watt University, UK.

Mohammadi

InterAct was recently established by Acteon to provide activity management services. The company initially is focused on field development work, subsea installation/intervention, and decommissioning and abandonment.

Acteon is a group of specialist engineering companies serving the global offshore oil and gas industry.

Conductor Installation Services (CIS) Ltd.

Great Yarmouth, UK, has named John Burgess as regional manager for the Middle East and North Africa, and Peter Kilian as regional manager for Asia Pacific. Burgess is based in Dubai, while Kilian headquarters in Singapore.

CIS' activities in the Middle East, North Africa, and Asia Pacific over the past three years have included more than 220 oil field conductor pile driving installation operations.

Conductor Installation Services Ltd. is part of the Acteon group of specialist engineering companies serving the global offshore oil and gas industry.

Germanischer Lloyd AG

Hamburg, has announced its acquisition of Canadian PV Inspection Services Ltd. and PV Inspection Services Inc. (US), thus increasing its surveying and certification activities in North America.

Canadian PV Inspection Services Ltd., headquartered in Dartmouth, Nova Scotia, offers inspections and technical supervision for the oil and gas, and other markets. PV Inspection Services Inc. is based in Houston.

In another announcement, the group has founded a new subsidiary based in Bangkok. Germanischer Lloyd Industrial Services Thailand Ltd. will provide services including design certification of technical plants, third party inspections, risk-based inspections, asset integrity management, risk studies, and certification of management systems. Somthai S. Tavechoke will head the new office. Tavechoke, an electrical engineer with an MBA from the University Thai Commercial Chamber, previously spent nine years with Technip Engineering Ltd.

For about 140 years Germanischer Lloyd AG has offered its services to the shipping industry, steadily expanding to now be a globally operating technical monitoring group. The group's services range from classical maritime requirements, such as operational soundness analysis and anti-corrosion advice, to offshore and onshore installations, to facility services.

Imports of crude and products

	Districts 1-4		District 5		Total US		
	11-23 2007	11-16 2007	11-23 2007	11-16 2007	11-23 2007	11-16 2007	*11-24 2006
	1,000 b/d						
Total motor gasoline	835	1,060	—	64	835	1,124	940
Mo. gas. blending comp.	396	692	—	22	396	714	478
Distillate	203	263	—	4	203	267	298
Residual	215	304	—	—	215	304	269
Jet fuel-kerosine	110	75	110	121	220	196	96
Propane-propylene	159	213	16	20	175	233	168
Other	939	648	84	39	1,023	687	748
Total products	**2,857**	**3,255**	**210**	**270**	**3,067**	**3,525**	**2,997**
Total crude	**9,123**	**8,664**	**1,231**	**1,156**	**10,354**	**9,820**	**9,758**
Total imports	**11,980**	**11,919**	**1,441**	**1,426**	**13,421**	**13,345**	**12,755**

*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

	*11-30-07	*12-1-06	Change	Change, %
	$/bbl			
SPOT PRICES				
Product value	102.61	71.70	30.91	43.1
Brent crude	93.65	62.15	31.50	50.7
Crack spread	8.96	9.55	–0.59	–6.2
FUTURES MARKET PRICES				
One month				
Product value	102.35	71.94	30.41	42.3
Light sweet crude	95.49	62.07	30.42	49.0
Crack spread	9.86	9.88	–0.02	–0.2
Six month				
Product value	103.95	79.39	24.56	30.9
Light sweet crude	89.30	66.86	22.44	33.6
Crack spread	14.65	12.53	2.11	16.9

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

Purvin & Gertz LNG netbacks—Nov. 30, 2007

Receiving terminal	Liquefaction plant					
	Algeria	Malaysia	Nigeria	Austr. NW Shelf	Qatar	Trinidad
	$/MMbtu					
Barcelona	7.30	5.50	6.42	5.38	5.72	6.33
Everett	6.07	3.99	5.73	4.06	4.61	6.38
Isle of Grain	8.59	7.22	8.55	7.10	7.89	8.34
Lake Charles	4.95	2.92	4.74	3.10	3.41	5.56
Sodegaura	5.51	7.47	5.76	7.55	6.80	4.79
Zeebrugge	6.83	4.90	6.34	4.78	5.53	6.32

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

Crude and product stocks

District	Crude oil	Motor gasoline		Jet fuel, kerosine	Fuel oils		Propane-propylene
		Total	Blending comp.[1]		Distillate	Residual	
	1,000 bbl						
PADD 1	16,829	50,752	24,604	10,257	59,484	14,627	4,816
PADD 2	63,543	47,787	15,584	7,069	26,878	1,160	22,404
PADD 3	159,744	64,495	29,080	11,894	30,048	16,725	31,118
PADD 4	15,343	5,294	1,526	454	2,619	327	[1]2,780
PADD 5	57,694	28,300	21,530	9,225	11,887	5,913	—
Nov. 23, 2007	**313,153**	**196,628**	**92,324**	**38,899**	**130,916**	**38,752**	**61,118**
Nov. 16, 2007	**313,605**	**195,190**	**90,674**	**38,830**	**131,005**	**39,097**	**61,213**
Nov. 26, 2006[2]	**340,774**	**201,069**	**91,463**	**37,932**	**132,818**	**41,816**	**69,698**

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

Refinery report—Nov. 23, 2007

District	REFINERY OPERATIONS		REFINERY OUTPUT				
	Gross inputs	Crude oil inputs	Total motor gasoline	Jet fuel, kerosine	Fuel oils		Propane-propylene
					Distillate	Residual	
	1,000 b/d						
PADD 1	1,558	1,564	1,679	91	511	140	72
PADD 2	3,129	3,103	2,038	180	935	49	190
PADD 3	7,600	7,557	3,519	721	2,146	315	715
PADD 4	561	557	279	19	167	13	[1]137
PADD 5	2,758	2,689	1,505	398	543	186	—
Nov. 23, 2007	**15,606**	**15,470**	**9,020**	**1,409**	**4,302**	**703**	**1,114**
Nov. 16, 2007	**15,180**	**14,897**	**8,964**	**1,370**	**4,180**	**685**	**1,110**
Nov. 24, 2006[2]	**15,315**	**15,161**	**8,856**	**1,399**	**4,042**	**584**	**1,068**
	17,448 operable capacity		**89.4% utilization rate**				

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

OGJ GASOLINE PRICES

	Price ex tax 11-28-07	Pump price* 11-28-07	Pump price 11-29-06
	¢/gal		
(Approx. prices for self-service unleaded gasoline)			
Atlanta	272.5	312.2	216.7
Baltimore	262.3	304.2	216.8
Boston	259.9	301.8	218.0
Buffalo	264.3	324.4	242.4
Miami	276.3	326.6	239.7
Newark	259.1	292.0	208.1
New York	246.2	306.3	232.0
Norfolk	259.0	296.6	210.9
Philadelphia	260.8	311.5	234.8
Pittsburgh	259.8	310.5	223.3
Wash., DC	269.9	308.3	227.3
PAD I avg.	262.7	308.6	224.5
Chicago	293.7	344.6	262.9
Cleveland	268.1	314.5	221.8
Des Moines	261.9	302.3	209.8
Detroit	273.0	322.2	227.9
Indianapolis	264.7	309.7	225.1
Kansas City	257.2	293.2	211.2
Louisville	268.5	305.4	219.8
Memphis	264.1	303.9	211.3
Milwaukee	263.7	315.0	235.7
Minn.-St. Paul	264.7	305.1	211.6
Oklahoma City	265.4	300.8	206.6
Omaha	246.3	292.7	223.9
St. Louis	267.8	303.8	215.9
Tulsa	260.7	296.1	206.5
Wichita	256.4	299.8	217.9
PAD II avg.	265.1	307.3	221.2
Albuquerque	271.2	307.6	219.6
Birmingham	265.6	304.2	218.2
Dallas-Fort Worth	261.7	300.1	215.5
Houston	253.2	291.6	208.3
Little Rock	263.9	304.1	212.9
New Orleans	259.2	297.6	213.9
San Antonio	253.9	292.3	209.8
PAD III avg.	261.2	299.6	214.1
Cheyenne	267.4	299.8	216.1
Denver	267.1	307.5	211.2
Salt Lake City	260.1	303.0	226.7
PAD IV avg.	264.9	303.4	218.0
Los Angeles	274.5	333.0	244.3
Phoenix	257.5	294.9	223.4
Portland	273.7	317.0	243.2
San Diego	284.1	342.6	249.2
San Francisco	300.4	358.9	266.6
Seattle	277.9	330.3	260.8
PAD V avg.	278.0	329.5	247.9
Week's avg.	**265.7**	**309.2**	**224.5**
Nov. avg.	**264.0**	**307.6**	**223.7**
Oct. avg.	**237.3**	**280.9**	**228.0**
2007 to date	**233.2**	**276.8**	—
2006 to date	**214.5**	**258.1**	—

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

REFINED PRODUCT PRICES

	11-23-07 ¢/gal		11-23-07 ¢/gal
Spot market product prices			
Motor gasoline (Conventional-regular)		Heating oil No. 2	
New York Harbor	251.04	New York Harbor	269.38
Gulf Coast	242.50	Gulf Coast	268.64
Los Angeles	253.50	Gas oil	
Amsterdam-Rotterdam-Antwerp (ARA)	239.94	ARA	276.26
Singapore	243.50	Singapore	262.74
Motor gasoline (Reformulated-regular)		Residual fuel oil	
New York Harbor	250.16	New York Harbor	176.50
Gulf Coast	245.41	Gulf Coast	179.40
Los Angeles	255.50	Los Angeles	197.88
		ARA	182.79
		Singapore	182.00

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

BAKER HUGHES RIG COUNT

	11-30-07	12-1-06
Alabama	5	4
Alaska	10	7
Arkansas	52	34
California	40	36
Land	38	32
Offshore	2	4
Colorado	114	87
Florida	0	0
Illinois	0	0
Indiana	2	0
Kansas	15	11
Kentucky	8	8
Louisiana	162	193
N. Land	61	60
S. Inland waters	27	19
S. Land	26	43
Offshore	48	71
Maryland	1	0
Michigan	1	3
Mississippi	8	17
Montana	10	18
Nebraska	0	0
New Mexico	73	97
New York	4	10
North Dakota	52	33
Ohio	13	10
Oklahoma	203	183
Pennsylvania	17	17
South Dakota	0	1
Texas	872	771
Offshore	12	10
Inland waters	0	4
Dist. 1	20	13
Dist. 2	34	20
Dist. 3	66	62
Dist. 4	81	89
Dist. 5	184	144
Dist. 6	115	123
Dist. 7B	44	36
Dist. 7C	62	41
Dist. 8	120	108
Dist. 8A	25	27
Dist. 9	44	35
Dist. 10	65	59
Utah	41	44
West Virginia	36	33
Wyoming	70	90
Others—NV-3; TN-6; VA-4	13	10
Total US	**1,823**	**1,717**
Total Canada	**381**	**442**
Grand total	**2,204**	**2,159**
Oil rigs	354	289
Gas rigs	1,463	1,423
Total offshore	63	86
Total cum. avg. YTD	**1,764**	**1,643**

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	11-30-07 Percent footage*	Rig count	12-1-06 Percent footage*
0-2,500	58	6.8	58	—
2,501-5,000	112	60.7	109	43.1
5,001-7,500	227	25.1	235	19.5
7,501-10,000	448	1.5	429	3.2
10,001-12,500	448	3.5	429	2.5
12,501-15,000	282	—	255	—
15,001-17,500	113	—	112	—
17,501-20,000	63	—	76	—
20,001-over	32	—	34	—
Total	**1,783**	**8.5**	**1,737**	**6.7**
INLAND	37		36	
LAND	1,696		1,640	
OFFSHORE	50		61	

*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]11-30-07	[2]12-1-06
	1,000 b/d	
(Crude oil and lease condensate)		
Alabama	14	20
Alaska	665	681
California	650	681
Colorado	51	62
Florida	6	6
Illinois	30	28
Kansas	95	98
Louisiana	1,391	1,355
Michigan	14	15
Mississippi	50	47
Montana	96	98
New Mexico	174	165
North Dakota	108	115
Oklahoma	169	173
Texas	1,370	1,346
Utah	45	50
Wyoming	144	146
All others	61	67
Total	**5,133**	**5,153**

[1]OGJ estimate. [2]Revised.

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

US CRUDE PRICES

$/bbl*	11-30-07
Alaska-North Slope 27°	78.19
South Louisiana Sweet	89.00
California-Kern River 13°	76.40
Lost Hills 30°	84.50
Southwest Wyoming Sweet	80.71
East Texas Sweet	84.75
West Texas Sour 34°	78.75
West Texas Intermediate	85.25
Oklahoma Sweet	85.25
Texas Upper Gulf Coast	81.75
Michigan Sour	78.25
Kansas Common	84.25
North Dakota Sweet	77.00

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

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

WORLD CRUDE PRICES

$/bbl[1]	11-23-07
United Kingdom-Brent 38°	94.70
Russia-Urals 32°	90.46
Saudi Light 34°	90.12
Dubai Fateh 32°	87.55
Algeria Saharan 44°	95.29
Nigeria-Bonny Light 37°	95.50
Indonesia-Minas 34°	94.02
Venezuela-Tia Juana Light 31°	91.01
Mexico-Isthmus 33°	90.90
OPEC basket	92.06
Total OPEC[2]	90.87
Total non-OPEC[2]	90.14
Total world[2]	90.54
US imports[3]	87.93

[1]Estimated contract prices. [2]Average price (FOB) weighted by estimated export volume. [3]Average price (FOB) weighted by estimated import volume. Source: DOE Weekly Petroleum Status Report.
Data available in OGJ Online Research Center.

US NATURAL GAS STORAGE[1]

	11-23-07	11-16-07	11-23-06	Change, %
	bcf			
Producing region	1,074	1,071	1,011	6.2
Consuming region east	1,977	1,991	1,940	1.9
Consuming region west	477	478	471	1.3
Total US	**3,528**	**3,540**	**3,422**	**3.1**
	Aug. 07	**Aug. 06**	**Change, %**	
Total US[2]	**3,017**	**2,969**	**1.6**	

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

Statistics

WORLDWIDE CRUDE OIL AND GAS PRODUCTION

	Sept. 2007	Aug. 2007	9 month average production 2007	9 month average production 2006	Change vs. previous year Volume	Change vs. previous year %	Sept. 2007	Aug. 2007	Cum. 2007
	Crude, 1,000 b/d						Gas, bcf		
Argentina	631	629	629	640	–11	–1.7	129.3	134.3	1,151.34
Bolivia	42	42	44	45	–1	–1.5	42.0	43.2	372.83
Brazil	1,760	1,758	1,756	1,706	50	2.9	30.0	30.0	256.60
Canada	2,675	2,781	2,625	2,475	149	6.0	472.5	478.2	4,455.75
Colombia	540	527	524	529	–5	–1.0	22.0	21.0	168.50
Ecuador	490	500	500	541	–41	–7.5	1.0	1.0	9.00
Mexico	3,161	2,843	3,127	3,307	–180	–5.4	189.2	209.8	1,664.78
Peru	114	106	113	116	–2	–2.1	9.0	9.5	66.29
Trinidad	120	120	123	148	–25	–17.0	120.0	120.0	1,039.87
United States	5,062	4,976	5,142	5,094	48	0.9	1,700.0	1,698.0	14,806.00
Venezuela[1]	2,380	2,360	2,389	2,583	–194	–7.5	70.0	70.0	647.00
Other Latin America	79	79	80	79	1	0.7	5.2	5.5	48.60
Western Hemisphere	**17,055**	**16,720**	**17,050**	**17,262**	**–211**	**–1.2**	**2,790.3**	**2,820.6**	**24,686.57**
Austria	17	17	17	17	—	–1.7	4.0	4.2	43.60
Denmark	308	323	313	331	–18	–5.4	26.0	26.5	208.45
France	20	20	19	21	–2	–9.7	3.2	3.2	27.16
Germany	67	67	68	70	–2	–2.2	44.7	45.5	447.85
Italy	108	111	109	110	–2	–1.4	28.0	28.0	258.80
Netherlands	40	39	41	25	16	64.0	120.0	120.0	1,905.00
Norway	2,190	2,134	2,273	2,504	–231	–9.2	233.1	229.5	2,284.74
Turkey	41	41	41	42	–1	–2.1	0.0	0.0	8.50
United Kingdom	1,414	1,241	1,507	1,512	–5	–0.4	180.0	166.5	1,950.69
Other Western Europe	5	5	5	5	—	–8.2	0.6	0.7	13.48
Western Europe	**4,209**	**3,998**	**4,392**	**4,637**	**–245**	**–5.3**	**639.7**	**624.0**	**7,148.27**
Azerbaijan	535	900	817	611	206	33.7	28.0	31.0	241.00
Croatia	15	16	16	17	–1	–5.4	5.7	5.5	54.51
Hungary	15	15	16	17	–1	–4.1	7.0	7.8	65.60
Kazakhstan	1,100	1,100	1,078	1,041	37	3.5	80.0	80.0	720.00
Romania	100	100	99	99	—	0.1	17.0	18.0	158.40
Russia	9,800	9,800	9,699	9,464	234	2.5	1,700.0	1,650.0	16,550.00
Other FSU	480	500	453	511	–58	–11.3	400.0	360.0	3,840.00
Other Eastern Europe	51	50	48	47	—	0.5	17.9	19.1	168.16
Eastern Europe and FSU	**12,096**	**12,481**	**12,226**	**11,808**	**418**	**3.5**	**2,255.6**	**2,171.4**	**21,797.66**
Algeria[1]	1,370	1,350	1,348	1,349	–1	–0.1	270.0	275.0	2,470.00
Angola[1]	1,718	1,735	1,662	1,398	264	18.9	4.0	5.0	26.90
Cameroon	85	85	84	88	–4	–4.5	—	—	—
Congo (former Zaire)	20	20	20	20	—	—	—	—	—
Congo (Brazzaville)	240	240	240	240	—	—	—	—	—
Egypt	630	630	640	673	–33	–5.0	40.0	42.0	368.60
Equatorial Guinea	320	320	320	320	—	—	0.1	0.1	0.54
Gabon	230	230	230	237	–7	–2.8	0.3	0.3	2.73
Libya[1]	1,720	1,700	1,698	1,699	–1	–0.1	22.0	23.0	197.90
Nigeria[1]	2,180	2,150	2,160	2,222	–62	–2.8	70.0	72.0	648.00
Sudan	480	480	470	408	62	15.3	—	—	—
Tunisia	81	97	97	65	32	48.7	6.2	6.4	58.81
Other Africa	232	232	232	240	–8	–3.5	9.7	10.2	89.57
Africa	**9,305**	**9,269**	**9,201**	**8,959**	**242**	**2.7**	**422.3**	**433.9**	**3,863.05**
Bahrain	170	169	172	173	—	–0.1	30.0	30.9	232.41
Iran[1]	3,920	3,920	3,916	3,892	23	0.6	240.0	250.0	2,235.00
Iraq[1]	2,180	1,990	2,008	1,917	91	4.8	5.0	4.0	44.00
Kuwait[1,2]	2,470	2,450	2,417	2,504	–87	–3.5	30.0	32.0	274.00
Oman	700	700	713	746	–32	–4.3	55.0	58.0	506.00
Qatar[1]	800	820	806	826	–20	–2.4	150.0	150.0	1,340.00
Saudi Arabia[1,2]	8,610	8,460	8,512	9,213	–701	–7.6	170.0	160.0	1,435.00
Syria	380	380	389	429	–40	–9.3	17.0	18.0	150.30
United Arab Emirates[1]	2,550	2,590	2,571	2,633	–62	–2.4	130.0	135.0	1,187.00
Yemen	380	380	366	347	19	5.4	—	—	—
Other Middle East	—	—	—	—	—	–32.5	9.7	10.8	78.51
Middle East	**22,160**	**21,859**	**21,870**	**22,678**	**–809**	**–3.6**	**836.7**	**848.7**	**7,482.21**
Australia	414	464	453	405	48	11.9	107.4	134.1	1,053.63
Brunei	185	173	180	203	–23	–11.4	35.6	35.6	313.16
China	3,726	3,757	3,754	3,695	59	1.6	204.6	203.0	1,799.75
India	685	680	683	676	7	1.0	83.5	83.8	730.38
Indonesia[1]	830	840	841	903	–62	–6.9	190.0	200.0	1,760.00
Japan	15	15	17	15	1	7.3	9.3	10.0	94.71
Malaysia	780	740	749	743	6	0.7	145.0	145.0	1,268.00
New Zealand	60	60	29	15	14	93.3	14.0	15.0	121.60
Pakistan	70	70	68	64	4	5.9	118.1	117.5	1,055.65
Papua New Guinea	50	50	50	49	1	2.0	0.5	0.5	4.45
Thailand	210	212	212	214	–1	–0.7	45.0	46.0	388.00
Vietnam	300	300	313	347	–34	–9.8	12.0	13.0	115.50
Other Asia-Pacific	32	32	35	32	2	6.4	94.3	94.5	836.59
Asia-Pacific	**7,358**	**7,392**	**7,384**	**7,364**	**21**	**0.3**	**1,059.2**	**1,098.0**	**9,541.41**
TOTAL WORLD	**72,183**	**71,720**	**72,123**	**72,708**	**–584**	**–0.8**	**8,003.8**	**7,996.6**	**74,519.18**
OPEC	30,728	30,365	30,327	29,741	586	2.0	1,347.0	1,371.0	12,237.90
North Sea	3,932	3,717	4,111	4,362	–251	–5.8	474.8	458.2	5,012.57

[1]OPEC member. [2]Kuwait and Saudi Arabia production each include half of Neutral Zone. Totals may not add due to rounding.
Source: Oil & Gas Journal. Data available in OGJ Online Research Center.

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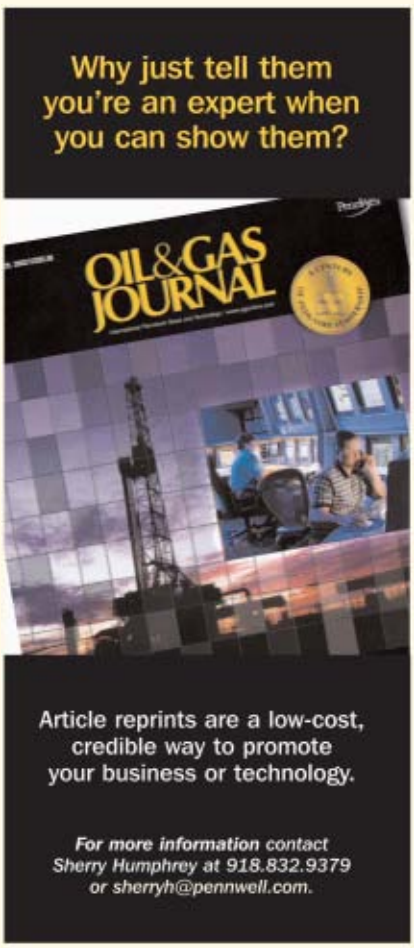

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Studies won't fix unintended consequences

What does a government do when unintended consequences highlight its mistakes? It conducts a study.

Democrats in the US House of Representatives adopt this approach to problem-solving in draft energy legislation they're circulating while Congress is in recess.

They want to act on energy despite the growing likelihood that disparate bills passed by the House and Senate won't be reconciled. One of many problems of those bills is a wildly prescriptive approach to fuel choice, a matter best left to markets.

One version of the draft legislation is even more prescriptive and therefore worse. It mandates sales volumes higher than current levels for renewable fuel, advanced biofuels, cellulosic biofuel, and biomass-based diesel.

Confusion doesn't end with the multiple categories. The requirements include market share thresholds and tests for greenhouse gas abatement. There are tradeoffs and a system for earning and trading credits in years when supplies don't meet target levels.

In short, the legislation is a formula: target volumes and secondary requirements growing as a function of time. That 21st-century adults think fuel markets can be managed this way is astonishing. That anyone thinks they should be is appalling.

In less than 2 years, formulaic renewable-fuel requirements of the Energy Policy Act of 2005 have made a mess. Leaping demand has raised the price of corn while a government-sponsored building binge brought too much corn-based ethanol to market too fast. So corn farmers are getting rich, while distillers and taxpayers are getting squeezed. Food prices are soaring.

Except for the enrichment of corn growers, these are unintended consequences—market distortions born of government activism.

And the House would respond with more activism—higher and more complex mandates. It thus answers a mistake with a bigger mistake of the same species.

The discussion draft, though, offers something new. It calls for periodic studies of the legislation's market and environmental effects. That way, lawmakers can have a record of their handiwork's consequences. There will be many of them if Congress passes an energy bill like the one now making the rounds, all costly—unintended, perhaps, but not unforeseen.

(Online Nov. 30, 2007; author's e-mail: bobt@ogjonline.com)

The Editor's Perspective

by Bob Tippee, Editor

Market Journal

by Sam Fletcher, Senior Writer

NYMEX suffers week of losses

During Nov. 26-30, the last full week of trading prior to the Organization of Petroleum Exporting Countries' Dec. 5 meeting, the front-month contract for benchmark US light, sweet crudes "suffered in absolute terms" both its largest weekly change and largest weekly decline ever, said Olivier Jakob, managing director of Petromatrix GMBH, Zug, Switzerland.

The January US crude contract dropped a total $9.47/bbl during the week, closing at $88.71/bbl Nov. 30 on the New York Mercantile Exchange. That surpassed "by exactly $1/bbl the collapse of March 2003 that followed confirmation of the strike on Iraq," Jakob said. The January IPE contract for North Sea Brent crude was "relatively stronger" with a loss of $7.50/bbl over the week to close at $88.26/bbl.

Despite the sharp drop in near-month crude prices, the Societe Generale Group, Paris, said the 5-year forward price was more resilient, declining to $83-84/bbl from $85-86/bbl in that period. "The backwardation has become significantly shallower, and in fact the low point on the forward curve is now December 2010; beyond this date, the curve is in shallow contango. The flattening of the curve indicates growing uncertainty about how tight the near-term physical markets will be and about the direction of front-month prices," said SGG analysts.

The market provided mixed signals during the week. The NYMEX sweet, light crudes contract dropped $3.80 to $90.62/bbl Nov. 28 after federal officials reported the fifth draw of US oil supplies in 6 weeks. But even as analysts were predicting the market's loss of momentum would prevent another surge toward $100/bbl crude, an explosion and fire shut down a key pipeline system transporting 1.5 million b/d crude from Canada to Midwest US refineries—representing 15% of total US oil imports. As a result, crude futures prices jumped to $95.17/bbl in overnight electronic trading, again illustrating how quickly a potential threat to oil supplies can turn a volatile market.

Enbridge Energy Partners LP, Houston, reported two employees died in an explosion and fire on its oil pipeline system 3 miles southeast of its Clearbrook, Minn., terminal Nov. 28. All four pipelines in that system were immediately shut down and isolated.

News of the mishap prompted speculation that the US government would offer emergency supplies from the Strategic Petroleum Reserve while OPEC might increase production. But by Nov. 29, Enbridge had restarted three of the four lines and said the line where the explosion and fire occurred should return to service in a few days. Cause of the mishap was still under investigation in early December.

But fast action in restarting most of the pipeline system helped cool the market, with the January crude price climbing to $91.02/bbl Nov. 29 on NYMEX. Since a major disruption of crude supplies to Midwest refineries "did not materialize," the market quickly resumed "its corrective pattern," Jakob noted.

Waiting for OPEC

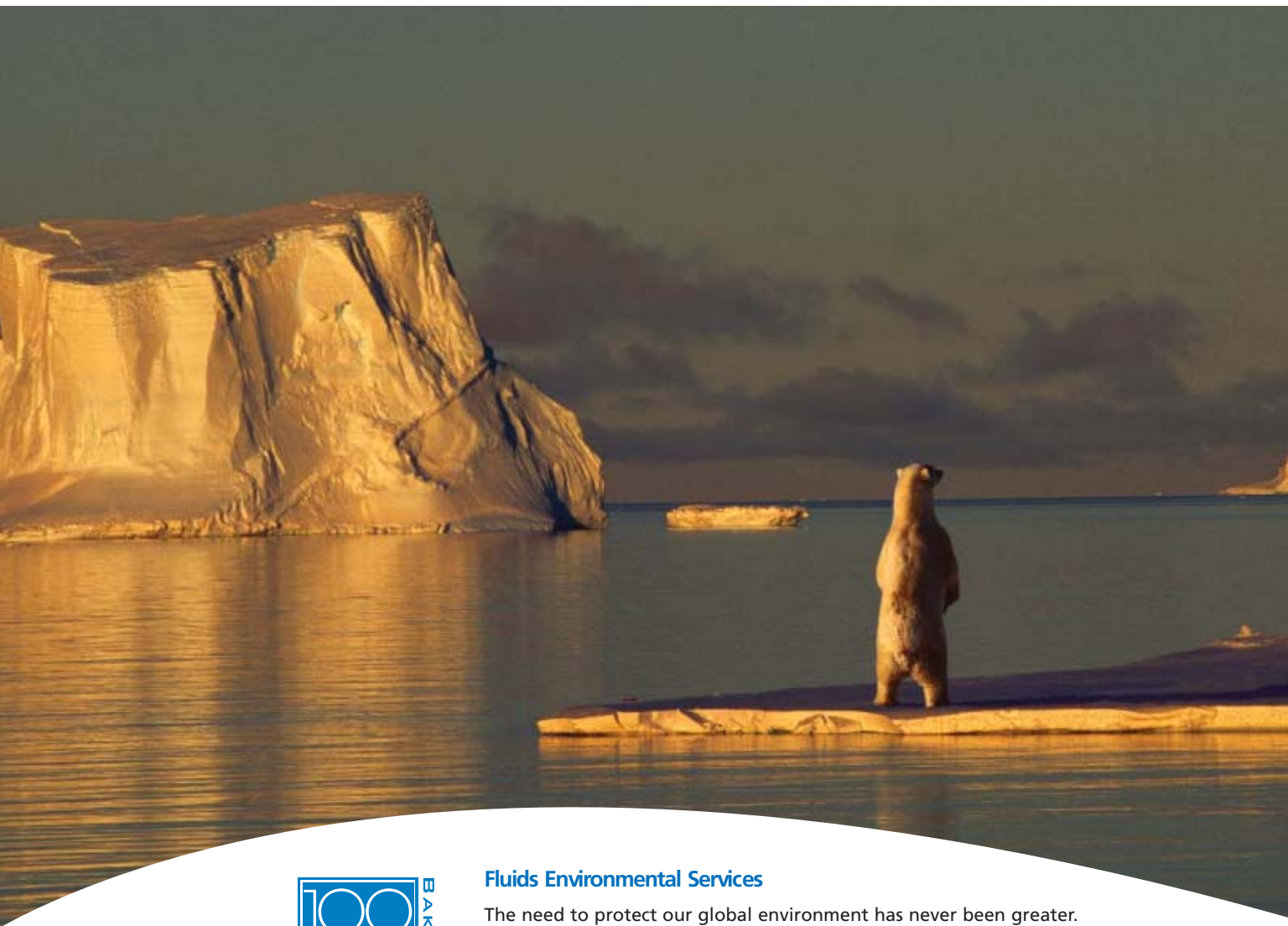
Through late November and early December, crude prices were "exposed to sound-bite headlines" of the possible outcome of the OPEC meeting. SGG analysts acknowledged the possibility OPEC might raise crude production quotas. However, they said, "We are skeptical about significant, sustained actual output increases." More likely, they said, "OPEC will keep crude supply fairly tight. Production will not exceed the current quarter's 31.2 million b/d in any quarter next year and will be cut back in the second and third quarters."

SGG analysts said there was "no reason for OPEC to change its strategy of tight crude stocks and backwardation, especially with growth in NGLs output and with prices easing from current levels." They therefore predict US crudes will average $81/bbl in 2008, up from $72/bbl in 2007. "Geopolitical risk also is expected to support prices next year. Price premiums will wax and wane, depending on developments. Nigeria, Iran, Iraq, and Saudi Arabia are the usual suspects [for political risks]. Russia and Venezuela add spice to the mix," SGG analysts said.

Jakob said, however, "We need to keep in mind that [Saudi Arabia] surprised everybody by sponsoring a 500,000 b/d increase at the [Sept. 11] meeting. At the time West Texas Intermediate was trading between $75/bbl and $78/bbl with a low of $68.60/bbl 2 weeks before the meeting, and by increasing production OPEC took the risk of a drop to $65/bbl." He said, "This time around WTI has been trading between $95/bbl and $98/bbl with a low of $88.45/bbl 1 week before the meeting. We are still $20/bbl higher than the acceptable price levels set at the last meeting while the fear of economic recession is much stronger."

(Online Dec. 3, 2007; author's e-mail: samf@ogjonline.com)

Environmental Worries?



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With all that has been accomplished, I believe that we have demonstrated how global expertise infused with homegrown capabilities can work seamlessly to bring the country one step closer to becoming South East Asia's deepwater hub."

— David Wood, President, Murphy Exploration & Production Company and Executive Vice President, Murphy Oil Corporation

"We were delighted when we made Malaysia's first deepwater oil discovery in July 2002 and to have it come on stream within five years is a tremendous accomplishment. Despite being one of the most challenging deepwater developments, Kikeh has set exemplary records and standards in safety, execution and timing. We could not have achieved this if we didn't set ourselves high standards from the onset of the project.

I would like to thank the entire Kikeh team for their hardwork, dedication and professionalism on this project."

— Roger W. Jenkins, Vice President, Sabah Operations, Murphy Sabah Oil Co Ltd

KIKEH
MALAYSIA

Discovery of Kikeh

Malaysia and Murphy Oil's future changed with the discovery of the Kikeh field in 2002. As Malaysia's first deepwater project, Kikeh brought the country new opportunities for technology transfer and greater interest from the oil and gas industry looking for new hydrocarbon reserves. For Murphy Oil, Kikeh represented a project that eventually will double the company's oil production.

On July 30, 2002, Murphy Sabah Oil Co Ltd, using Diamond Offshore's semi-submersible drilling rig Ocean Baroness, made Malaysian history with the Kikeh No. 1 well. Until this time, Malaysians only knew "kikeh" as a small deepwater fish, but Murphy's Kikeh development soon became known as a project that featured many industry innovations and one that would become Malaysia's first deepwater project.

Located 65 nautical miles north of the eastern Malaysian state of Sabah, the development was discovered in Block K in water depth of 1,320 meters.

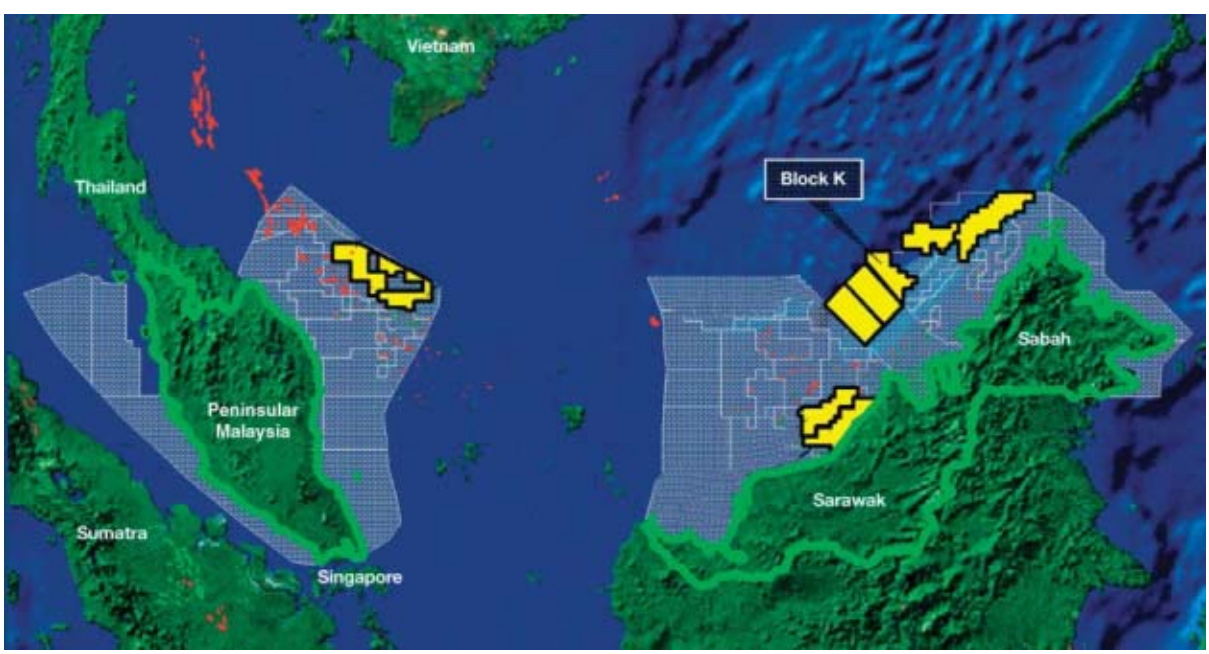
"It was our third deepwater well offshore Malaysia, and we knew early we had a major discovery on our hands — an exciting challenge for Murphy to grow in Asia," said Roger W. Jenkins, Vice President for Sabah Operations of Murphy Sabah Oil. "Two more delineated wells confirmed the Kikeh prospect, estimated initially to be in excess of 400 million barrels of high quality crude oil."

Planning and development

Jenkins immediately began building a team to manage one of the largest resource developments in Southeast Asia. The original three-man project team of 2002 eventually evolved into a core group of top professionals leading a staff of more than 85 people.

"For most of 2003, we planned and drilled four appraisal wells and carried out a well test for what is today an eight-reservoir large field," Jenkins said. "We were quick to finish development plans, and by 2007 had completed and developed the field in five short years from discovery — a new industry benchmark."

The project, with an estimated US$1.7 billion in investment, was sanctioned in April 2004, while partner Petronas Carigali Sdn Bhd and subsequently,

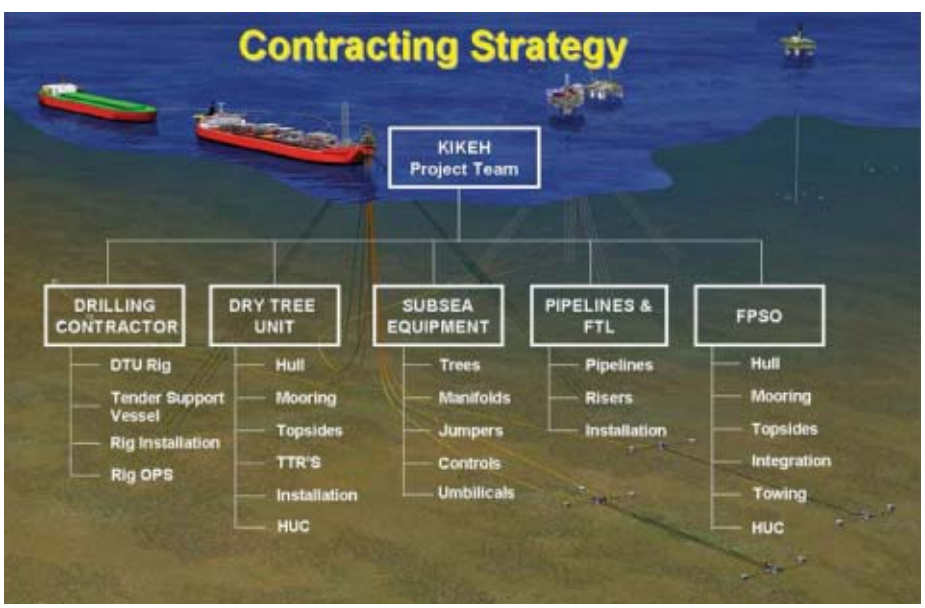


its parent, the Malaysian national oil corporation, Petroliam Nasional Berhad (Petronas), approved the field development plan in November 2004.

Steve Dechant, the Kikeh Project Facilities Manager helped craft the contracting strategy to put the project in the fast lane. "The strategy involved a small team approach that allows for timely decision making and clear accountability," says Dechant. The team was committed to selecting experienced and qualified contractors with a good industry track record. "Being Malaysia's first, this was key to our success at Kikeh." The fundamentals behind our contracting strategy were:

Malaysia's first deepwater production came onstream on Aug 17, 2007

- Maximize the utilization of contractors' area of expertise – the goal was to maintain the largest scopes possible that remained within the selected contractors' area of expertise.
- Select only industry proven contractors – the team was relying on the contractors to perform. Experience on the contractors part was essential.
- Define functionality and allow contractors to be innovative – functional specifications were used to maximize the use of contractors' unique systems and equipment.
- Accept alternative approaches from the contractors – alternatives were encouraged and accepted if the contractors approach met the functional requirements.
- Utilize Lump Sum, EPCIC contracts where possible – the



Kikeh Firsts

- First Spar constructed in Malaysia
- First floatover mating of a Spar topside and hull
- First use of a tender assist drilling rig on a Spar
- First Spar installed outside the Gulf of Mexico
- First use of a specialized Fluid Transfer Line between a Spar and an FPSO
- Largest FPSO conversion in Malaysia
- First turret-moored FPSO used in conjunction with a Spar

team wanted to "lock in" to fixed prices with the busy outlook for the oil and gas industry in 2004 and beyond.

"Murphy awarded major contracts in December 2004 for the Floating Production, Storage and Offloading (FPSO) vessel, and the Dry Tree Unit (DTU)," said Jenkins. In early 2005, contracts for pipelines and the innovative Fluid Transfer Line (FTL) also were awarded. J.P. Kenny Mustang assisted with the Front End Engineering and Design (FEED) concept for developing the field in water depth of 1,320 meters. "It took us 10 months to complete the engineering and selected the final project concept," Jenkins said.

"Everyone at Murphy was under enormous pressure when working on the documentation of the field development plan, and today the work, which was drawn some three years ago, was finished on schedule."

Interface management at work

Managing a project of this magnitude is another challenge and an Interface Management group consisting of a Facilities Management team as well as Site Management teams, which were formed immediately, handled this. Cash flow and project payments also were handled by the project controls team, which managed milestone payment plans for each contract.

Work on the various contracts was carried out on a global scale — in the United States, Monaco, the Netherlands, Finland, Australia, Singapore, and in Kuala Lumpur as well as various other sites throughout Malaysia. "We had the project implemented in a multitude of places, which was a challenge. Through our Interface Management concept, we were able to manage the benchmarks of each contract," said Jenkins.

"We also had a strategy that required each bidder to meet local content requirements outlined in their contract, and we followed up with experts overseeing the progress of each of them," he said. "We did all this while maintaining a top level safety record and are proud to have delivered this project successfully."

"Eventually we will have 13 producing wells on the Spar and three subsea wells," said Bill Hughes, Kikeh's Senior Production Manager. "We should be up to 120,000 bpd production by the end of 2008. We will also have six water injection wells on the Spar and 11 subsea wells, plus one gas injection well subsea until such time as the gas pipeline to Labuan (Petronas methanol plant) is completed in March or April 2008."

"The happiest moments were when we awarded the contracts within a six-month time frame — the last quarter of 2004 and the first quarter of 2005, and the day we achieved first oil — Aug 17, 2007 just five short years from when the development began," said Jenkins. "I am delighted we have successfully accomplished the development of this mega energy project in Malaysia." ✹

Small Team, Big Results

For the Kikeh project, Murphy Sabah Oil chose to utilize a "fit-for-purpose" Interface Management approach. The Facilities Team management consisted of a core group of people on the Project Management Team (PMT) based in Kuala Lumpur. That group included Facilities Manager Steve Dechant, Interface Manager Melih Oran, QA Manager Philip Howard and Installation Manager Doug Smiley.

Putting the team together

Each of Murphy's EPCIC (Engineering, Procurement, Construction, Installation and Commissioning) Contract Teams, or Site Management Teams (SMT), varied in number of personnel and depth of coverage. Key to each SMT was the Contract Manager and Interface Engineer. Most teams also designated an Engineering Manager, who often was the same person as the Interface Engineer. Murphy's Operations and Drilling and Completions Teams also interfaced with the Facilities' PMT and SMT's.

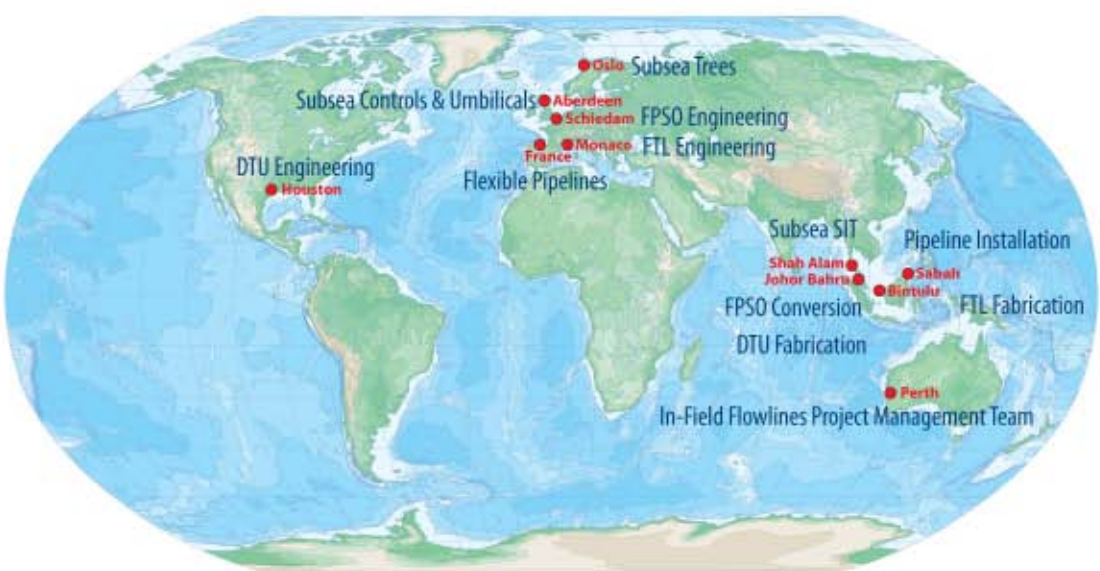
In total, approximately 85 people made up the Murphy PMT and SMT. Other oil and gas operators generally have project management teams twice that size. Because of the relatively small size of these teams it was essential that the key positions be filled with well-qualified and highly experienced engineers and managers.

Kikeh's Interface Management Approach saw a core team of 85 qualified managers and engineers managing the project

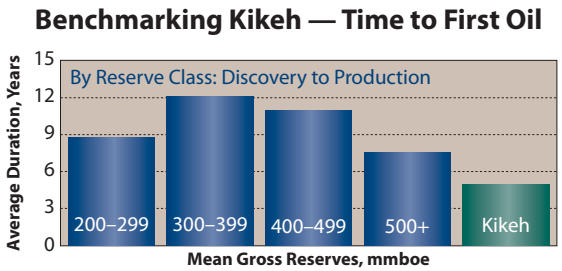
"By industry standards, the Murphy PMT and SMTs were small sized team," said Interface Manager Melih Oran. "As a general rule, our Facilities Team management approach was to trust the contractors to do what they are experts at doing and provide a fit-for-purpose facility in accordance with codes, rules and regulations and the contracts."

Face to face communications

Interface Management requirements built into the EPCIC contract requirements included a Dedicated Interface Manager from each EPCIC and encouragement of direct communication between EPCICs. "Murphy was copied and kept in the loop, and helped facilitate, but generally we let the EPCICs request and exchange data as needed," said Oran.



The wealth of deepwater knowledge, capability and technology for Kikeh came from all four corners of the world



The EPCICs were also required to attend Quarterly Interface Meeting (QIM) held in Kuala Lumpur over two days. "Face-to-face communications proved to be invaluable," said Oran.

Each EPCIC was encouraged to utilize their own interface management system, data sheets, format, numbering, etc. Oran noted that Murphy did not impose a unique "Murphy system" on them.

Ultimately, seven QIM sessions from April 2005 to August 2006 were held along with an Installation Campaign Readiness Review (ICRR) in late-January 2007, all in Kuala Lumpur.

Five main contracts

The interface program covered five main contracts, and the challenge was to keep information flowing between all parties involved in a timely fashion. "We had to coordinate with every one involved in the project including the contractors to keep to the schedule. A lot of energy was spent on ensuring smooth operations," Oran said.

Brainstorming sessions were held among the managers, both at Murphy and with the contractors, he explained, noting that easily more than 100,000 management and engineering man-hours were spent on Interface Management.

All these hours were spent on daily communications, correspondences, weekly and bi-weekly project team meetings, weekly and monthly status reports, monthly multi-contractor Interface Teleconferences and the Quarterly Interface Meetings.

Staying on track

Murphy had stressed that all parties involved in the project hold party-to-party discussions. This resulted in every element of the development completed as per design, fitting into the functions of each component — for example the functioning and operation of the DTU, FPSO, FTL and TAD.

Interfaces between EPCICs could have posed substantial commercial and technical risk to Murphy. " If EPCIC 'A' hardware, controls, process, or installation activities did not mesh with Contractor 'B', then Murphy could have been exposed to cost and schedule delays to make it mesh as well as potential technical issues to make the interface work," said Oran. "Also, when we were planning for installation, we tried to be aware of places where two groups would need to work at the same time so as to minimize simultaneous operations and any potential conflicts that might have resulted."

"It was a learning process," said Oran. "Sometimes we had to reel people back from focusing on the details, but we accomplished our goal to have first oil within five years of discovery." ✹

More than 100,000 management and engineering manhours were spent on Interface Management, says Oran

Technology Transfer

Malaysia has gained extensively from the implementation of the Kikeh deepwater project through technology transfer.

Kikeh is one of the largest oil and gas projects to be undertaken in the country and that, too, on an accelerated pace in the award of five Engineering, Procurement, Construction, Installation and Commissioning (EPCIC) contracts.

Global project, local capabilities

The Malaysian national oil corporation, Petroliam Nasional Berhad (Petronas), had set up a special tender committee for the project, the first deepwater development that has introduced technologies for building Spars, and other components of deepwater oil exploration and production to Malaysia, according to Tengku Saifuzzaman Tengku Ahmad Shahruddin, Development Manager at Murphy Sabah Oil Co. Ltd.

"Technology transfer has taken place in every aspect of the high-end equipment, plants and materials that are being used at Kikeh," he said.

The FPSO, Spar, FTL, and subsea manifolds were fabricated in Malaysia, while a portion of the subsea trees was assembled in the country.

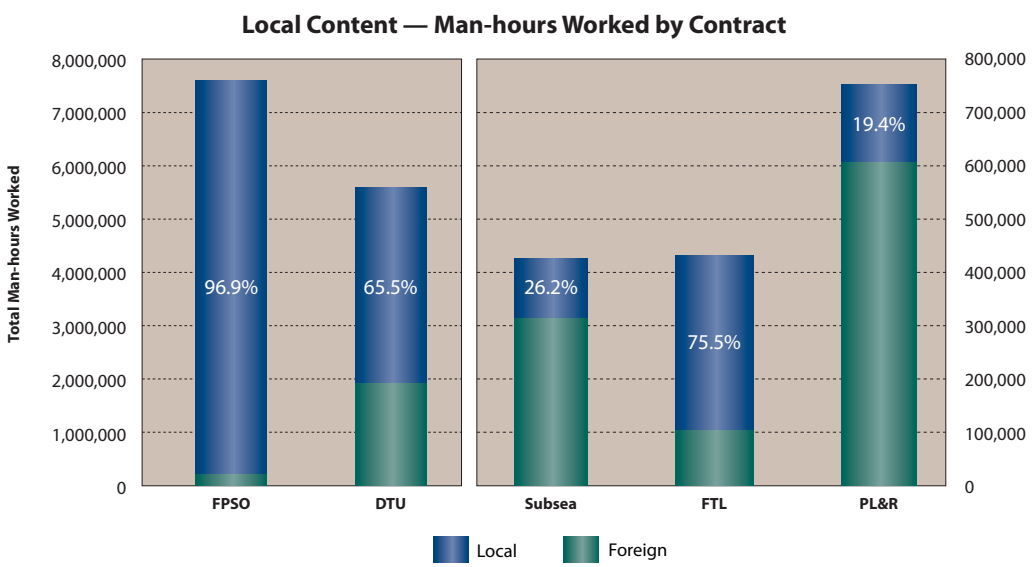
Government support

"Murphy and Malaysia have demonstrated that we can handle projects of this magnitude," he stressed. "Petronas' collaboration has been unwavering in terms of project support and procurement, especially in facilitating tender approvals."

Malaysian governmental agencies lent full support during the importation of equipment and material, ensuring a smooth flow of items for the mega project, Tengku Saifuzzaman noted. Most of the components were brought into the country within one year, starting from the second quarter of 2005.

The 2005 construction period was a big challenge, he added, amongst which:

- Getting the equipment and materials into the country on time
- Interfacing with the EPCIC contractors as well as their subcontractors and vendors
- Maintaining project schedule



Kikeh has seen technology transfer taking place in every aspect of the facilities and services being used

- Ensuring the availability of manpower resources
- Maintaining strict safety standards

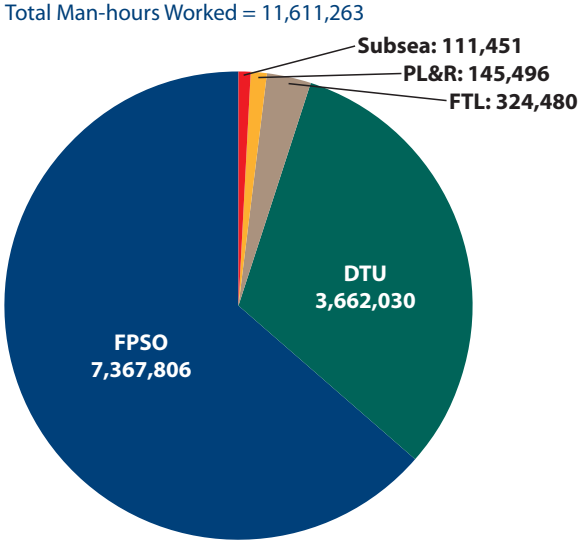
Murphy was very specific in selecting the right equipment and material, with its project team reviewing every aspect of the items.

"We had a design competition and invited all four manufacturers of the DTU. But we decided on the Spar design as the most economically suitable option for producing oil from the field," he said.

The Kikeh deepwater field development is a major landmark project for the Malaysian upstream industry, as it marks the country's successful foray into deepwater production of hydrocarbons, thereby establishing the credentials necessary for the country to realize its aspirations of becoming the region's deepwater hub, stressed Alfian Mohamad, Murphy's Site Engineer for the Kikeh project based at MMHE's Pasir Gudang yard in southern Peninsular Malaysia. ✹

Local Content

Total Man-hours Worked = 11,611,263



FPSO Conversion

In areas of the world where pipeline infrastructure has not yet been developed, Floating, Production, Storage and Offloading (FPSO) vessels are an integral part of offshore projects. Murphy Oil's Kikeh development is similarly using a Very Large Crude Carrier (VLCC) for its production, processing, storage and offloading of crude oil and managing natural gas output.

Malaysia International Shipping Corp Bhd (MISC) and Single Buoy Mooring (SBM), the global FPSO operator, joined forces to provide one of the best production options for Kikeh, and converted the 1974-build Atlas VLCC for FPSO Kikeh.

FPSO Kikeh takes shape

Responding to Murphy Oil's call for a world-class FPSO, MISC and SBM formed the joint venture, Malaysia Deepwater Floating Terminal Sdn Bhd (MDFT), which acquired the VLCC formerly owned by the Stena Group and converted it into a Class A1 FPSO to standards set by ABS Group.

Atlas' hull is made of thick mild steel with 35 mm bottom plates, which provide ideal fatigue characteristics for a 20-year offshore field life. "As a VLCC trading vessel it was well maintained, and, as such, a significant amount of the vessel systems and equipment have been retained and refurbished to support the new operation," said Barry Courtney, Murphy's FPSO Manager.

A Kikeh project-specific SafeHull A analysis was performed on the Atlas, as were extensive inspections. Indeed, in addition to superior fatigue resistance, the thick plates provide larger corrosion margins.

The Stena series is well known by SBM, which has been operating a Stena Concordia class tanker as an FSO for more than seven years and owns two other Concordia class sister-ships for conversion to FPSO in present market. The Atlas design is typical of the pre-

The FPSO is the central processing facility for Kikeh measuring 367m in length, breadth of 55m and weighs 273,000 tons

FPSO Kikeh was converted at the MMHE shipyard in southern Peninsular Malaysia

FPSO sailaway on April 15, 2007

Marpol single hull VLCCs built in the mid-1970s.

Production onboard

MDFT signed the letter of intent with Murphy Oil in December 2004 and immediately began engineering and design for now-renamed FPSO Kikeh to accommodate the field life span of 20 years. "Its topside facilities are designed to handle and store 120,000 barrels a day of crude oil, 150 million standard cubic feet per day of natural gas output and 260,000 barrels a day of water injection," said Courtney.

The FPSO has plants for compression and conditioning of the associated gas for gas injection and future export of gas. The target is to have zero gas flaring on the FPSO. Treated gas from the produced hydrocarbon is used to fuel the main boilers and the topsides gas turbine generators on the FPSO deck.

Space has been reserved on the FPSO Kikeh to add another equipment module in case of enhanced production or future tie-in from related field development. Utilities such as power generation, heating medium, cooling medium, and instrument air will either come with this new module or that the available utilities on the FPSO will accommodate the incremental demand.

The FPSO was converted at the Malaysia Marine and Heavy Engi-

FPSO Kikeh top deck

neering (MMHE) shipyard at Pasir Gudang, located on the southern tip of Peninsular Malaysia near Johor Bahru. Equipment and material procurement were administered to Petronas guidelines and the FPSO's design specifications included SBM Corporate Engineering Standards.

Turret technology

The external turret mooring system on FPSO Kikeh consists of an extension from the vessel's bow called the rigid-arm, which supports a turntable, a gantry, a slewing bearing, two manifold decks and a chain-table. Anchor lines are attached to the chain-table by means of unijoints. The bearing allows the turntable to freely weathervane around the anchoring system so that the vessel can take up the position of least resistance to the prevailing weather at all times.

Hydrocarbons are transferred to the FPSO turret from subsea wellheads via flexible risers, and from the Dry Tree Unit (DTU) via production flowlines supported by the Fluid Transfer Line (FTL). The three-phase production fluid then enters the turret manifolding system where it is directed into production manifolds, one high-pressure production, one low-pressure production and one test manifold. The crude passes through dedicated torodial swivels and onto the FPSO's process system.

High-pressure gas and water pass in the reverse direction from the FPSO process system through the turret via similar means for injection into the field to provide enhanced means of oil recovery. Provision for future handling of a subsea tie-back, as well as future processed oil and gas has been allowed in the turret. Electro/hydraulic umbilicals carry power, instrumentation signals, and utility fluids to the subsea manifolds and the DTU.

The turret is designed to allow mooring legs and risers hook-up on site with riser lifting and chain

The first turret-moored FPSO used in conjunction with a Spar

tensioning being carried out by a chain pulling electro/hydraulic winch which is permanently located on the turret and energized with temporary jumpers from the FPSO.

The horizontal position of the turret structure relative to the vessel is determined by the so-called extreme "overrun" condition. This is the condition where the vessel moves ahead of its center position, so that the anchor lines, which are below the keel of the vessel, are tensioned. "The usual design case for the overrun condition is the tail end of a storm, when the wind speed drops, but waves are still strong.

The bow extension, the distance between the turret center line and the vessel fore perpendicular, is sufficient to maintain a positive clearance between the hull of the vessel and the anchor leg passing under it in an all overrun cases. As part of the conversion work, the tanker bulb was cut to optimize the bow extension, while accommodating the rigid-arm structure retrofit.

Pitch and heave

In vertical position, the turret is positioned such that when the vessel is at its fully loaded draft, the turntable main deck remains clear from the wave crests in severe weather conditions. The required air gap is

Lifting and integration of the turret to the FPSO

defined taking also into account vessel motions — pitch and heave.

The turret fixed part, geo-stationary, forms the non-weathervaning side of the vessel mooring. It includes the chain table at the lower rim, and is suspended from the main slewing roller bearing mounted on the upper side of the turret turntable. The fixed part houses the riser termination and the piping between the riser and the swivel entry. The fixed part structure transfers the mooring loads from the anchor legs to the extension structure, rigid arm, via the turntable.

Upper and lower decks

The manifold decks are supported from the upper side of the slewing bearing. It is composed of a cylindrical part, attached to the main roller bearing, two decks and the swivel stack support. The lower manifold deck supports the rigid piping from the riser terminations and provides support for the emergency shutdown valves and flow control valves.

The lower deck supports the upper manifold deck, by means of structural columns, where the rigid piping is grouped underneath the swivel before being passed through the dedicated swivel paths. The swivel foundation is supported off the upper manifold deck by columns.

The riser interface with the turret is designed on the basis of flexible risers, each equipped with a sliding bend stiffener. The riser interface with turret is based on a series of I-tubes of typically two to three meters in length.

The base of each I-tube is designed with a support flange and bolt circle to interface with the flexible riser bend-stiffener. The purpose of the bend-stiffener is to maintain flexible pipe curvature at the turret interface within allowable limits.

The anchor legs are arranged in a pattern of three bundles of three equi-spaced legs, each bundle 120 degrees apart to each other. The mooring legs are configured with an angle of five degrees between each line within a bundle.

20-year field life

All operations on the DTU/Spar, which is rated as an unmanned platform, are being handled from the FPSO.

The vessel has accommodation for 118 people with lifeboats and rescue boats as a full part of the safety and rescue operations. It is also equipped with a helideck designed for a Sikorsky S61N and S92A helicopters.

"The design premise was for FPSO Kikeh to remain on site during the 20-year field life without the need to dry-dock, providing many years of service for this key Malaysian deepwater development," said Courtney. ✹

The SPAR Option

The Kikeh Spar project was a new engineering challenge for Malaysia and the team of international engineers tasked to design and build the Spar. A Dry Tree Unit (DTU) on a cylindrical floater was deemed the best economical and technological option for oil and gas production from the deepwater Kikeh field.

Early planning and about 15 parallel studies were carried out for Malaysia's first Spar project as soon as Murphy Sabah Oil selected the economical Spar option for the Kikeh project instead of other deepwater choices, including a tension leg platform (TLP).

"This was a fast track project for which we did various studies parallel to design work," said David Sims, Murphy's topside client representative. "In addition to the studies, we designed models modified to suit Malaysian waters," he adds.

The Malaysia Marine & Heavy Engineering Sdn Bhd (MMHE) shipyard based in Pasir Gudang, Johor, on the southernmost tip of peninsular Malaysia and international engineering group, Technip, took on the challenge of building the country's first Spar.

Work began in February 2005

"The Spar is easier to move over the drilling areas, especially the deepwater basins and it may actually help speed up the drilling," Sims said. However, it still was a challenge to work on the Spar. "We began with the basic piping and instrument drawings, and had to consider various elements including the well condition and temperatures."

Considerable attention was paid on how to manage weight on the deck. Though the Spar is moored on site, it is subject to movement based on the sea waves and wind flow.

Geotechnical study on the seabed covered the current flow and wind direction among other aspects, and environmental, safety and hazardous studies all helped in the design of the Spar.

"We even did a study on heat dispersion for the two flares on the Spar as wind directions are very impor-

Construction of the Spar hull underway in Pasir Gudang, Johor

The Spar hull was completed in 14 months

tant, given the highly sensitive materials on the deck," said Sims.

Other materials on the Spar topside include corrosion inhibitors and demulsyifiers. Engine exhaust study was another major contributor to the deck planning for the Spar, which houses a large quantity of methanol to be used for well injection to help with the oil flow from the well-depth as well as through the 1,320 meters of water depth. "Oil flow from such deep sea environments tend to freeze," said Sims.

The Spar is easier to move over the drilling areas especially in deepwater basins

Continuous studies and reviews

A highly crucial study — the Reliability, Availability and Maintainability (RAM) study — helped select all the main components for the Spar deck. Sims singles out one example of the generators. "We wanted to ensure we have generators that were reliable, available on schedule and were maintenance friendly."

The Spar's topside design was completed in about six months at Technip office in Kuala Lumpur.

The Murphy team continuously reviewed the designs and studies. The challenge was to build an unmanned Spar-based production platform. Once the production/development well drilling program is completed, the unmanned DTU platform would be operated from the FPSO Kikeh, located 1.6 km away.

A 48-inch diameter Fluid Transfer Line (FTL), which is a first of its kind of floated pipeline, links the FPSO Op-

The Spar hull was loaded onto heavy transport vessel, The Mighty Servant 1, and sailed to Kikeh site on September 26, 2006

Transferring personnel to the Spar

erations Room with the DTU. The heavily coated FTL has three 10-inch lines, one 8-inch line and umbilicals. It transmits operational signals and power supplies for the plants on the Spar.

Handling the Spar

Three cameras located in the FPSO Operations Room monitor operations at the DTU and the surrounding area of the Spar. "These will be the eyes," Sims said.

The Kikeh Spar topside is designed for 25 wells, but the initial field production will come through 14 wells, including three water injection wells through a manifold system.

A multi-phase flow meter will be used to monitor and manage the flow of oil to the FPSO production/processing system. "We have designed the system to pump 'dry oil' or the processed oil from the FPSO to DTU," said Sims. This oil will be pumped into wells to re-start wells or if any one becomes hydrated.

"There are no plans to shut any well once it starts producing, but we have taken precautions as it will be necessary to shut wells in case of emergencies, such as fires or blow-outs," Sims explained. It is called the Emergency Shut Down (ESD) system.

Safety first

Other main equipment on the Spar deck includes fire-fighting equipment, water pumps to fight fire, almost all of which are housed in the Mechanical and Electrical Building (MEB).

The Spar's topside will also have diesel pumps for supplying fuel to the two cranes and the 1,000-kilo-watt generators.

"We have also placed two 22-man lifeboats and two 25-man rafts on the deck," he adds.

All these are safety measures for drilling crew and crew that would be sent on the deck during well work-over programmes and wire logging of wells. On average a six-man team is expected to be on the Spar/DTU deck during maintenance work.

Technip Finland, which has designed some 15 hulls for Spars, designed the Kikeh Spar hull while MMHE fabricated it at the Pasir Gudang yard.

"Work on the hull started during the rainy season of 2005 but fabrication process was continued around the clock," says Rahim Mamat, Murphy's Site Engineer with 25 years of field experience and in charge of the Project Control and Scheduling.

"It was a learning curve for the first tank, and it took us 14 months to fabricate the hull, which was also a first-time project at MMHE and in Malaysia," he adds.

Twenty engineers from Technip Finland along with the Murphy and MMHE teams met the challenge of completing the largest section of the Spar, weighing some 13,000 tonnes.

Upending in progress

The topside being prepared for transfer onto the Spar hull via a float-over technique

"We also worked on the topside concurrently, including the process and instrument drawings," he said.

The Spar's hull is designed to bear the impact of a collision with a ship, though such incidents are unlikely.

The lower part of the four-section hull comprises of hard tanks for ballast, but ballast would not be used as the hull is designed to float. Heavy slurry will be stored for balancing the Spar. The two-heave plates in the Truss Section and soft tank balances the Spar.

The semi-tender assist drilling (TAD) rig is another component of the project. It was important to design the Spar to accommodate the mooring point of the TAD. ✹

Innovative Flowlines System

One of the unique features of the Kikeh project was the industry introduction of a Fluid Transfer Line system between the Spar and the FPSO.

Single Buoy Mooring (SBM) developed this concept, also known as the Gravity Actuated Pipe (GAP) system, for the near-surface transfer of hydrocarbon fluids between two floaters, such as a Spar and FPSO, on deepwater oil fields. The Kikeh Spar and FPSO are located 1,600 meters from each other.

"There were several challenges with using seabed flowlines," said Geoff Stone, Kikeh Project FTL Manager. "The FTL was built as an alternative solution to these hurdles."

The Kikeh flowline challenges included:

- Flow assurance due to low seawater temperatures
- The high discharge pressure to overcome the pressure drops induced by much longer flowlines length
- Seabed congestion

The EPCIC contract for the provision of the Kikeh FTL system was awarded to SBM in April 2005 with a targeted completion date of September 2007.

Continuous steel pipe suspended between floaters

The Kikeh FTL system bundles the production flowlines and power/control umbilical around a carrier terminated with two towheads, the latter being suspended from the Spar and FPSO by tether chains.

"The carrier-pipe is a continuous steel pipe," said Stone. Its diameter is 1.2m increased to 2.3m at its extremities with internal bulkheads for ensuring its structural integrity in case of damage (buckling under external pressure). "The diameter of the carrier-pipe is determined so that its buoyancy keeps the bundle within the prescribed high and low water depth limitations when it is subjected to the density variations of the conveyed fluids. The submerged weight of the bundle is adjusted by trimming chains installed along the bundle length," he added.

Kikeh's FTL is the first in the world that uses gravity actuated pipe (GAP) technology

Preparing the FTL towhead for its launch

The towheads, located at each carrier extremity, support the fluid and mechanical connections of the bundle to the Spar and FPSO. Specifically:

- Flexible steel jumpers and intermediate steel pipe spools connect four 10 diameter flowlines, which include two high pressure and one low-pressure product lines, as well as one water injection line, to the Spar and FPSO. The towhead includes also two heavy clump weight chains for stability
- On the Spar side a taut twin tether chains arrangement connects the towhead to the Spar at 60 m water depth (one of the chain is redundant),
- On the FPSO side a catenary twin tether chains arrangement connects the towhead to the FPSO turret (one of the chains is redundant). The weight of the chains catenary is increased by the incorporation of steel weights clamped to them. Also, the additional weight

Construction of the FTL underway in a purpose-developed site near Bintulu, Sarawak

The FTL being towed onto sea surface using the Normand Installer

of the arrangement is compensated by an overhead buoyancy tank which provides added stability,

- The umbilical, which is connected between the two topside facilities via the FTL system in a continuous length, provides high voltage electric power to the Spar and enables instrumentation data exchange via optical fibers.

Fabrication and launching

SBM fabricated the FTL on a temporary purpose-developed site near Bintulu, Sarawak. This site consisted of a reclaimed strip of land, 1,600m × 100m, perpendicular to the coastline, on which a railway track was installed to run the bogies used to support the system during launching to sea.

The carrier 20m sections were prefabricated using a high quality fabrication shop process and assembled on the launching bogies into a continuous system 1,300 m long. Semi-automatic welding and automated ultrasonic inspection (AUT) were of the highest quality. The towheads' caissons and wing tanks were prefabricated at Johor Baru and Bintulu and assembled at the ends of the carrier.

"The flowlines were fabricated using quality pipeline fabrication methods on either side of the launching track and later lifted into the articulated supports clamped to the carrier-pipe," said Stone. The jumpers/umbilical termination supports were installed and the connecting rigid pipe spools (to be installed offshore) were prefabricated and field tested using dummy jumper termination. All flowlines and spools were hydro-tested on site.

Tow To Field and Installation

"The FTL launching began on May 8, 2007 with the

The flowlines were fabricated using quality pipeline fabrication methods

Artist impression of the suspended FTL connected to the Spar and FPSO

arrival on site on the main installation vessel, SBM's Normand Installer and numerous assistance tugs and patrol boats," said Stone.

The FTL system was towed on the sea surface along a pre-defined route using the Normand Installer. Upon arrival at the Kikeh field, each of the two chains of the FTL was connected to the Spar and then the FPSO. This was followed by installation of the flexible jumpers and the control umbilical. This phase of the installation work was completed on June 10, 2007.

In order to complete the FTL system installation and to allow its commissioning, subsea divers from SBM's diving subcontractor Offshore Subsea Works installed connecting steel rigid spools at the Spar and FPSO locations at water depths of between 65m and 190m. They completed the work by August 12. ✹

Drilling in Malaysian Deepwater

The Kikeh field was discovered using Diamond Offshore's Ocean Baroness. The Baroness was then used for two appraisal wells in the field before being released from the site in late 2002. The two rigs used for development work on the project were Diamond's Ocean Rover, a semi-submersible, and Sea-Drill's West Setia, a semi-tender assist drilling rig. The average development well depth ranged from 3,000 to 5,000 meters in 1,320 meters water depth.

The variable sand quality, number of reservoirs and shallow hazards make the project unique, according to Michael McFadyen, Senior Drilling Manager at Murphy Sabah Oil Co Ltd.

Managing logistics

"One of the biggest challenges on the drilling and completions side was managing logistics in an area where we were the first to develop in deepwater," said McFadyen. "This involved keeping the rig operation supplied with equipment, materials and specialists to continue uninterrupted operations to avoid downtime and meet the schedule."

The batch-set operation for the structural and surface casings was the largest of its kind for Murphy and Diamond Offshore, setting 23 wellheads in 63 days. More than a million sacks of barite were transported to the shore-base facility, mixed into liquid mud and consumed offshore on the Rover. These large volumes and quantities of materials required a major upgrade of the shore-base facility before the project start.

Additionally, the supply base had a very small number of berths available for the larger deepwater vessels, requiring berth sharing with other operators. "The successful Kikeh batch set operation was very intense and required a strong team effort, solid planning, and clear communication," said McFadyen.

Semi submersible Ocean Rover will be responsible for the 17 sub sea wells

Ocean Rover and West Setia

The West Setia will drill and complete a total of 18 wells from the Kikeh Spar while the Ocean Rover semi-submersible will be responsible for the 17 sub sea wells. "The West Setia represents another first for the industry by utilizing a semi tender assist drilling rig on a Spar host facility," said McFadyen. "The key challenge to overcome on this was to make the installation and rig-up during the monsoon season."

The Kikeh development drilling and completion cost is in the $15 million range for each Spar well and $25 million per sub-sea well.

The total drilling completion budget was in excess of $800 million, says McFadyen, who oversaw well engineering, cost estimation, well design and well delivery for the project. At first oil, there were 11 subsea and five Spar wells drilled on the development.

Typical casing designs for a Kikeh subsea well is 36", 20", 13-5/8" and 9-5/8" casings. The Spar wells were similar but used 16" instead of 20" to slim down the

At first oil, five Spar and 11 sub-sea wells were drilled on the development

West Setia, a semi-tender assist drilling rig, will drill and complete 18 wells from the Kikeh Spar

The West Setia's 16-3/4" surface blow-out prevention stack being rigged up prior to DTU drilling operations.

riser and reduce loads on the Spar.

The producers were completed cased and perforated or open hole with Expandable Sand Screen dependant on the reservoir properties. The injectors were cased and perforated or expandable sand screen in casing.

"A 'lessons learned' data-base, pre-planning and field involvement all helped to foster teamwork and success," said McFadyen. "The average well is now being drilled in approximately 1.5 days / 300meters from spud to TD." The best completion time to date was on the Rover at 11 days through well clean up. The team pushes for continuous improvement and incorporates lessons learned on previous operations in current planning.

Murphy has the experience of drilling in Malaysian deepwater, having drilled 30 wells since 2002 in Blocks K,L,P & H, including the July 2002 Kikeh discovery. The oil and gas company also has the

Quality Assured

Quality Assurance and Quality Control management is a mammoth task for a project of Kikeh's scale. Industry expert Philip Howard spearheaded Murphy's efforts which ensured that every piece and item used in the development and operation of Kikeh field for 20 years was tested, audited and classified to international standards — ISO 9000, ASME, API, AWS, DNV and ABS.

Cost-conscious Murphy conducted Quality Assurance (QA) at a much reduced cost of similar projects of this magnitude by relying on the contractors to perform the Quality Control (QC) function.

"To achieve this, we had at least one dedicated QA expert assigned per Engineering, Procurement, Construction, Installation and Commissioning (EPCIC) contract performing Quality Assurance oversight of the contractor's activities and sites," said Howard, the QA/QC Manager at Murphy Sabah Oil Co Ltd.

Periodic audits

"Periodic audits were also carried out with independent third parties to ensure we have the best quality products in place for the field which is designed to produce for 20 years without significant maintenance shutdown," according to Howard.

Specialists and experts were taken on to assist in auditing the contractor and its various vendors' work practices and sites where the work was being carried out as well as the finished product, in the case of safety or production critical equipment. "We felt that was the most suitable way of handling Quality Assurance, without having to take on a lot of staff," he explained.

Periodic audits were carried out to ensure best quality products in place to achieve 20 year life of the Kikeh field

Constant monitoring was carried out on critical aspects of the facilities, including construction and welding of the FTL

Due diligence in specific areas, including HSE, fatigue, structural process analysis etc., also was carried out as part of the QA effort utilizing specialists via auditing processes.

"One other aspect of the Quality Assurance role was to monitor and verify the required certification of various segments of the project," he said.

Constant monitoring was carried out on certain critical aspects of the assets/facilities, gas compressors, riser systems, power generation, control/safety systems, and cargo system as well as the contractors' ability to handle the assigned project. A failure of any of such systems would be potentially dangerous and would cause loss of production as well as potentially assets and lives, Howard pointed out.

Welding was one of the most critical issues in the process of putting together the Fluid Transfer Line due to the extremely minute welding defect sizes allowable to achieve the 20-year life of the Kikeh field.

"The contractors stepped up to the plate and provided the necessary hands on Quality Control functions to provide a quality product," Howard said. ✹

Expanding the Supply Base

The Kikeh field has a dedicated supply base to ensure a smooth flow of supplies for producing up to 120,000 b/d of crude oil and 150 million standard cu ft per day of natural gas for the next 20 years.

Murphy's Logistics Manager Mark Adams led the base development, which is located at the Asian Supply Base on Labuan island, off Sabah. Other oil and gas companies have operations located in other parts of the base.

Gearing for fast growth

Murphy invested $6.5 million on upgrading its portion of the 55,000 sq acre base, where its staff of 26 runs the daily operation. The base upgrading was accelerated with work started in September 2005 and completed by April 2006 as installation work began in the field.

Located some 120 km from Kikeh field, the base is geared for the fast-paced development, especially the installation and initial three years of production. "After three years, the focus shifts totally to support for the production function," said Adams.

In addition to the building of a new pipe yard, the existing jetty and pipe yard have also been upgraded, noted Adams. Five offshore support service boats, four anchor handling tug and supply boats, one crew boat, and two helicopters ferried supplies such as OCTG tubular goods, drilling equipment and people to work on the drilling rigs as well as the FPSO and the DTU.

Sikorsky S-76 C+ helicopters lend aviation support to the field's structures. The hangar was especially upgraded for the two helicopters.

Peak activity

The challenge was at the peak of activity when the base contained huge stocks and inventories, including 6,000 tonnes of conductor/casing, 40,000 tonnes of dry bulks, 34,000 tonnes of liquid mud, and 6,500 tonnes of fuel and water.

The liquid mud plant at the base was upgraded to 1,000 barrels of oil-based mud capacity and the addition of 10,000 barrels of water-based mud new capacity as well as 8,500 barrels of brine capacity.

The base has supported the transportation and installation of 13,000 tonnes of the Spar hull, and 4,500 tonnes deck floatover during the development phase while the production wells were being drilled.

"The goal was to have suitable resources available to support the peak activity as the project moves into a mature operating environment," says Adams. ✹

Kikeh supply base in Labuan — geared for fast-paced development

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Schlumberger delivers innovative technologies and collaborative support to the Kikeh development

Drilling and completing deepwater wells is a major challenge, but to be the first to undertake a deepwater development in an area with no prior infrastructure takes courageous leadership. Murphy took on the challenge to move Malaysia into the realm of deepwater producing countries. That leadership demanded Murphy select partners with the experience, expertise and innovation to operate and deliver on this important project.

Well construction and service contracts for Murphy's Kikeh field development were awarded in late 2004 and early 2005. Schlumberger received multiple related contracts including providing electric wireline and perforating services; well testing and tubing conveyed perforating; measurement- and logging-while-drilling (MWD and LWD) equipment and services; cementing services; downhole completion equipment and services; and rig networking and communication services.

Working closely together, Schlumberger and Murphy have been able to achieve record batch drilling times, with completions being delivered in less than 14 days—half of the industry average and half of Murphy's forecast.

To deliver first oil in five years after initial discovery is an outstanding result for Murphy and its partners. Multiple benchmarks testify to the success of the project, including the speed at which the various phases are being completed, the cost against budget, and first oil within five years of discovery.

Schlumberger deepwater technologies and support have been integral in delivering these results. This deepwater expertise extends to a multitude of services including wireline evaluation, LWD/MWD, cementing, communications, subsea, completions, testing, perforating, and interpretation.

Expansion of Labuan facility for advanced drilling and completions support

Schlumberger built an infrastructure within Malaysia to deliver a complete range of drilling and completions services with a focus on deepwater operations. This investment included construction of extensive maintenance facilities; the addition of resources capable of handling and storing huge quantities of cement and chemicals; enhancements to quality control processes and procedures with a focus on equipment assembly; and the addition of computerized pressure testing and equipment make up.

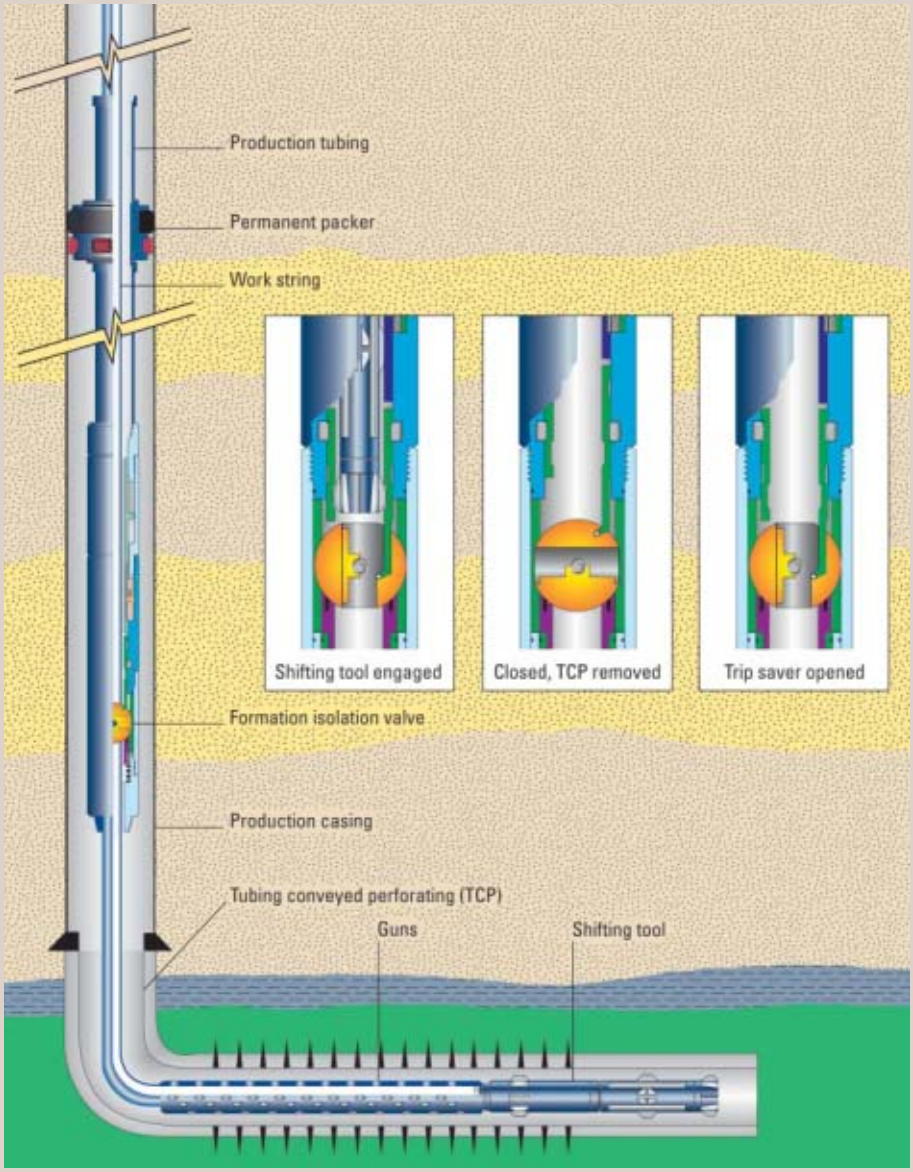
The outcome is the Schlumberger Deepwater Center of Excellence in South East Asia, which is dedicated to expanding the deepwater industry inside Malaysia, and is operated with a growing Malaysian and regional workforce.

The Schlumberger-Murphy collaboration

The impact and value of the collaboration between Murphy and Schlumberger has been recognized in both organizations. To produce first oil within five years of the initial Kikeh discovery, it was important for multiple disciplines to provide and apply a range of technologies for optimal drilling and completion solutions.

The initial drilling phase was performed within budget, with the completions phase on track to be below budget. Major collaboration benefit comes from less obvious deliverables, such as a reduction in the number of wells required to deliver anticipated production levels. Additionally, lessons learned from the Kikeh development can be transferred to other deepwater projects within Malaysia and the region, and Murphy will be able to apply the lessons to its deepwater projects in the Gulf of Mexico and Congo.

The Schlumberger Completions team has been working on Murphy's Kikeh Project at Labuan.



Formation Isolation Valve (FIV) systems provide "no kill" perforating.

Schlumberger provided a support team to manage the work scope under the Murphy contracts, in most cases working as a team from within Murphy's offices. Additional support was available from the Schlumberger regional office based in Kuala Lumpur, including a Drilling Engineering Center, a host of geoscience, engineering, data processing and data handling expertise, plus extensive lab capabilities. Specific to the completion work, Schlumberger provided a project manager and a focused team of experts. This team accessed engineering support from a range of global resources, including multiple engineering and manufacturing centers and the Schlumberger InTouch Lessons Learned database—bringing experiences and best practices from deepwater operations throughout the world.

Innovative technologies and solutions

A range of innovative solutions were applied to mitigate risks, reduce costs and increase productivity as part of this project. Many of these innovative solutions have been, or will be, presented in technical papers at industry conferences around the world. A full session at the 2008 Offshore Technology Conference (OTC) will be dedicated to Murphy and the Kikeh project, with multiple papers focused on the successful application of various Schlumberger technologies.

Murphy and Schlumberger jointly focused on moving routine activities offline, out of the critical path of drilling and completion operations. A major reduction in critical path activities was possible after thorough review. The impact is clear: completion times have been reduced by half, to less than 14 days per well, with massive saving on rig day rate and increased cash flow by bringing production on stream earlier.

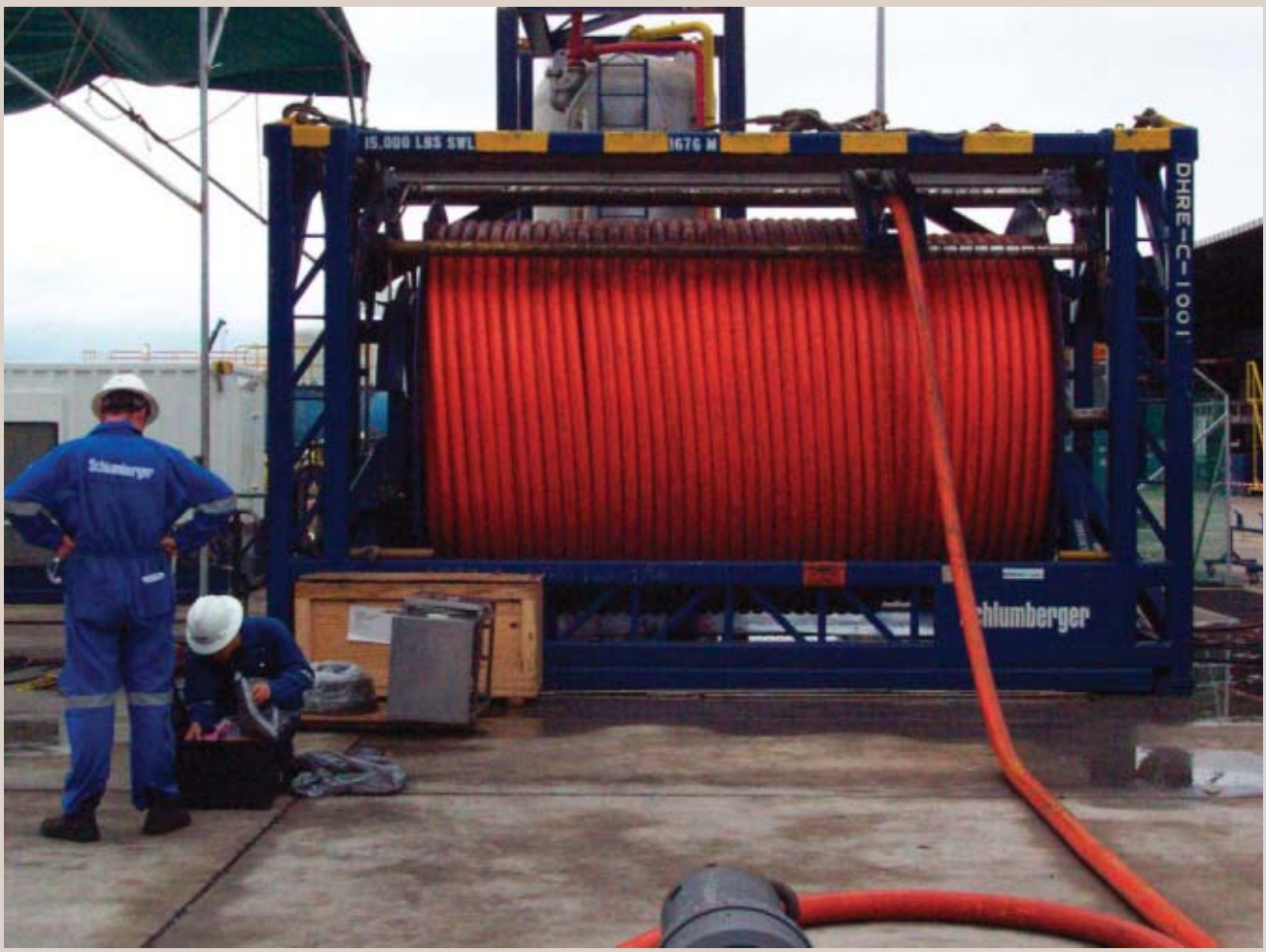
Well construction and evaluation solutions

The Schlumberger DeepCEM* and DeepCRETE* cementing systems support deepwater operations with increased cement strength and stability, reduced time to deliver and set, all without requiring special equipment or personnel. These attributes were key as the Kikeh development wells' surface casing was batch set and required fast, reliable and quality cement supporting those casings.

Shallow water flows challenge drilling operations and have been observed in a number of the Kikeh wells. DeepCRETE technology is able to isolate the formation with a lighter fluid, and reduces waiting on cement time without complicating the deepwater operations. The DeepCRETE system enhances both early gel and compressive strength developments, thus combating shallow water flows. Its low densities minimize the risk of losses associated with low fracture gradient in deepwater.

The DeepCEM slurry systems focus on the long-term durability of the set cement, not just the effective slurry placement and short-term isolation. Such systems enable cemented annular sheaths to withstand a wide range of downhole stresses without failure.

Kikeh's cementing operations were monitored in real time using the Schlumberger InterACT* monitoring and data delivery system, allowing Schlumberger and Murphy engineers to make quick decisions, mitigating operational delays.



SenTREE 7 provides safety and control at the ocean floor during completions and testing operations, using a 4,300 ft umbilical back to surface.

When Murphy engineers needed to compute the oil reserves in thinly bedded turbidite sections of the Kikeh reservoir, Schlumberger geoscientists worked with Murphy to develop a methodology to compute the cumulative sand thickness. Three high-resolution log measurements were used to separately identify the thin beds, using thresholds to identify the reservoir quality sands. Schlumberger geoscientists and Murphy engineers were able to quickly deliver cumulative and consolidated sand counts from the three methods. Correlations and sensitivity analysis were used to verify the results culminating in quantification of the reserves in the thin sand laminations.

During the deepwater exploration operations, Schlumberger and Murphy jointly developed an Imploding Sphere technology, a solution enhancing seismic signals during wellbore seismic surveys. This improved the quality of information and resulted in better decision making in an area where signal quality and data have been historically weak.

An ultrasonic imager tool is traditionally used to evaluate cement and casing. On Kikeh this measurement was adapted to measure the wear on the deepwater drilling riser, helping to evaluate exposure to risk and to mitigate the need to invest in expensive backup drilling risers.

As the network and communications provider, Schlumberger combined wireless Local Area Networks (LAN) and satellite technology to enable Murphy to deliver and monitor its well data in real time, permitting key personnel to stay connected and to collaborate effectively.

Well completion solutions

In completing the subsea production wells, a full SenTREE* 7 completion and test tree is used to provide operations safety and full downhole control of the well during completions and testing operations. Unique to Kikeh is the modified SenTREE 7 for water and gas injector wells. For these wells, select features are used, permitting the use of the rig's BOP system while the subsea test valves are removed. Both systems were custom designed to integrate flawlessly with Murphy's subsea tree and the Schlumberger-installed completions. Without utilizing SenTREE 7, a completely different subsea tree design would be required, adding cost and complexity to the development and potentially delaying cleanup and production testing.

A solution specific to the Kikeh development was a one-trip tubing conveyed perforating (TCP) system. To provide reservoir protection and well control, the Schlumberger QUANTUM maX*

Schlumberger Regional Deepwater Technology Hub in Kuala Lumpur

Southeast Asia is fast becoming a major deepwater E&P region. Murphy's Kikeh project is only the first, as additional exploration and field development plans are processed and evaluated. A large investment in people, facilities, and a range of other resources is essential for deepwater field developments to be viable.

In providing deepwater support to Murphy for the Kikeh development, the expansion and upgrade of the Schlumberger Labuan operations facility was a major step. Meeting the stringent demands of deepwater operators, the facility has become the first Schlumberger Deepwater Operations Center of Excellence in Southeast Asia.

With the anticipated growth in deepwater E&P activity in the Middle East and Asia, early in 2007 Schlumberger formed a "Deepwater Technology Hub" based in Kuala Lumpur. The goal of the Technology Hub is to align the company's research and technology efforts, with the deepwater goals and challenges of the various deepwater operators. Through working with deepwater operators like Murphy and Petronas, both in the Middle East and Asia, Schlumberger is able to focus and invest in the real deepwater challenges, to apply lessons learned, to bring value to new deepwater projects as risks are mitigated, efficiencies are incorporated, productivities are enhanced, and new ways of doing business are developed.

The Schlumberger Middle East and Asia Deepwater Technology Hub has brought together a core team of experts in deepwater well construction, completions and production. These experts will influence the direction of Schlumberger investments in future deepwater technologies. They are already engaged with regional operators on a diverse array of challenges ranging from subsea interventions, to flow assurance and the ability to identify producible reserves in thin bed reservoirs, a solution that Schlumberger applied to help Murphy confirm a commercial reservoir in the thin bed laminations of the Kikeh field.

The commitment from Schlumberger to deepwater technologies and solutions, with regional and local experience and expertise, and an established deepwater center of excellence and deepwater technology hub, all point to a service provider uniquely positioned to respond to any deepwater challenge.

gravel-pac system for HPHT conditions was modified to function with a deepwater Full Bore Set Down (FBSD) service tool coupled with the company's FIV* Formation Isolation Valve tool, and run as an integral part of the 7-in TCP PURE* perforating system. The objective of this unique system is to achieve the field production plateau quicker, with a reduction in the number of wells required to deliver that level of production.

The need for an oriented 7-in TCP system was identified early in the completion design analysis. The Schlumberger Reservoir Completions group developed the 7-in oriented perforating gun system utilizing much of the proven OrientXact* tubing-conveyed oriented perforating system, originally designed for high-performance deepwater application. With some wells requiring sand control and the use of expandable screens, the 7-in oriented TCP system maximized the number of perforations open to flow, mitigating expandable screen erosion and ensuring maximum production with the screens in place. Use of this system saved Murphy up to $15 million in alternate sand control options.

Downhole pressure monitoring is being provided by the Schlumberger NPQG Permanent Quartz Gauge. The gauges were originally identified by the production team as a requirement for reservoir and well monitoring. The gauges allow pressure monitoring for the life of the field and provide data and information for informed decision making. The gauges have proved invaluable as a completion operations tool, in addition to monitoring and documenting tool operations downhole. The monitoring capability increased confidence in tool operations and subsequently reduced rig time.

The downhole NPQG Permanent Quartz Gauge system has been instrumental in understanding the dynamics and formation of hydrate plugs. With access to pressure data, fit-for-purpose planning and action can be taken, and in at least one case, inhibition chemicals were injected downhole. Key to providing flow assurance for the deepwater wells is the capability to inject chemicals to inhibit hydrates, scale and wax. Schlumberger has provided chemical injection capability with its Dual-Check Chemical Injection (DCIN) gauges, installed on all of Kikeh's production and injection wells.

Schlumberger has made a commitment to deepwater technologies and solutions. The experience, expertise and innovation have established Schlumberger as the one service provider uniquely positioned to deliver, whatever your deepwater challenge.

**Mark of Schlumberger*

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Diamond Offshore conducts Kikeh's development drilling operations

Diamond Offshore's semisubmersible Ocean Rover is conducting development drilling operations for Murphy's Kikeh field project. The rig has been drilling offshore Malaysia for Murphy since July 2003.

Diamond Offshore provides contract drilling services to the energy industry around the globe and is a leader in deepwater drilling. The company owns and operates one of the world's largest fleets of offshore drilling rigs, consisting of 30 semisubmersibles, 13 jackup units and one drillship. Two additional premium jack-ups are under construction in Singapore and U.S. Gulf of Mexico. The company's headquarters are in Houston with regional offices in Louisiana, Mexico, Australia, Brazil, Indonesia, Scotland, Qatar, Singapore, the Netherlands, Norway and Malaysia. Approximately 4,500 personnel work for the company on board our rigs and in our offices.

Malaysian drilling operations

In 2000, Neural Services Sdn. Bhd entered into an agreement with Diamond Offshore to represent their interests in Malaysia. In 2001, this partnership registered its first success with Murphy Sabah Oil Co. Ltd., contracting the Ocean Baroness deepwater semisubmersible drilling rig. The contract was extended and amended to allow for the substitution of the then newly upgraded Ocean Rover deepwater semisubmersible drilling rig in July 2003. The Ocean Rover has been drilling for Murphy offshore Malaysia since then and has proven to be a very effective unit in performing field development operations in their Kikeh deepwater development program.

Ocean Rover upgraded for Kikeh project

The Ocean Rover is an enhanced "Victory" class heavy-duty semisubmersible drilling unit that underwent a major structural, stability and equipment upgrade in Singapore prior to the commencement of the Kikeh project. The rig is currently equipped to operate in water depths up to 6,500 feet with an eight-point self-contained combination mooring system and is in the process of further water depth enhancement to drill in water depths of up to 8,000 feet

The rig has a nominal drilling depth capability of 35,000 feet with a variable deck load of 5,000 long tons. Significant features include a dedicated riser gantry crane, and the ability to hang-off the blowout preventer and riser assembly and casing strings away from the well center using the Hydralift Tripsaver. The rig also features an integrated pipe-handling system consisting of knuckle-boom crane, tubular conveyor and pipe-racking system that provides the ability to make up tubulars off the critical path.

To maximize the offline efficiencies of the Ocean Rover without impeding the critical path operations, Diamond Offshore, in conjunction with Neural Services, worked closely with Murphy to continuously evolve and improve the rig's operating procedures. The changes required additional crew members including extra crane operators, deck coordinators and assistant drillers to be on duty at all times.

Safety is our number one priority

While the equipment and technology make these types of operations physically possible, ultimately it is the crews that convert it into true value for the client. Throughout the evolution process, safety has remained the number one priority and the Ocean Rover has now operated for more than 725 days without a lost time accident (LTA). This is a significant achievement as the rig has a diverse crew complement of up to eight different nationalities on board at any one time. There are currently around 100 Malaysian nationals employed onboard the Ocean Rover. Diamond Offshore, in conjunction with Neural Services, employs 29 Malaysian nationals onshore in support roles.

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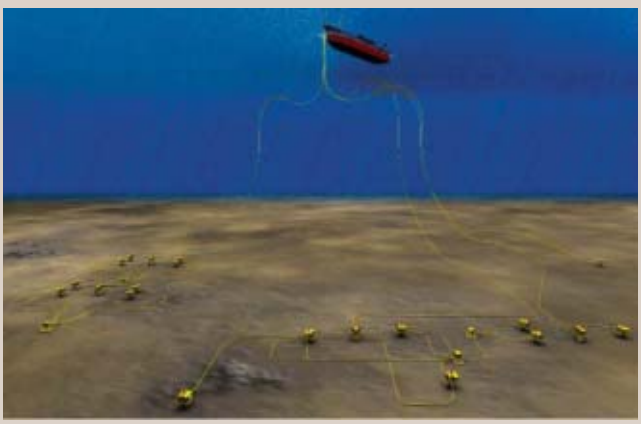
Murphy's Kikeh is the First Deepwater Development in Malaysia … and Aker Kvaerner was there

Murphy Oil, in partnership with Petronas Carigali, awarded Aker Kvaerner to provide the subsea production system for its historic Kikeh development. As a leading global provider of engineering and construction services, technology products and integrated solutions within the energy sector, Aker Kvaerner was well suited to successfully execute this landmark project. Aker Kvaerner is part of Aker Group, a Norwegian-based industrial conglomerate with over 23,000 employees and 11,000 agency workers in nearly 30 countries.

The Project

The Kikeh field, which is located in approximately 1,350 meter water depth offshore Sabah in Eastern Malaysia, consists of a combination of production and injection trees and multiple drill centers with a contract value of $100 million for the subsea scope.



Kikeh subsea field layout

The Subsea Scope of Work

Aker Kvaerner, through its Aker Kvaerner Subsea unit, provided Kikeh with 16 subsea wellsets comprising three production trees, 12 water injection trees and one gas injection tree, related controls, five manifolds, 17 km of umbilicals, connection systems, subsea distribution equipment, project management and engineering, IWOCS and associated tooling. All equipment was designed for a 20-year life of field.

The subsea tree system comprised 16, 5-in. x 2-in. subsea Christmas tree systems rated for 10,000 psi working pressure, and designed for 5,000 ft water depth and in accordance with API 6A and API 17D specifications. Deliveries for the project commenced in May 2006 with one water injection tree and one production tree and will continue through 2007. The project for the trees was managed from Houston with the Work Package Manager, Cody Moffitt, relocating to Norway for the assembly and test phases of the first eight trees, then to Malaysia for the final eight trees to manage the process on site.

The Kikeh subsea trees represent a new chapter in design and innovation for Aker Kvaerner Subsea. The design was optimized to save weight and maximize on reducing any flow assurance issues by greatly reducing the amount of flow loops. The Kikeh trees also incorporate PassThru™ technology in the tubing hanger to allow the customer to have continuous monitoring and control of critical downhole functions during installation of the tubing hanger.

Additionally, the tooling that is used for installation of the trees and components has also been optimized to save time during installation or retrieval by making all of the tools multifunctional in their design and use. The tooling also is being optimized to allow for future business in Malaysia that may run 15,000 psi trees.

The subsea production controls system is an electro/hydraulic Mux system comprised of 16 subsea control modules (SCM), subsea distribution equipment and topsides equipment. The SCMs incorporate Aker Kvaerner's iCon Subsea Electronic Module (SEM). The iCon SEM brings advanced technology to subsea production

One of 5 Aker Kvaerner Subsea manifolds being installed.

16 subsea wellsets (tree & controls) were ordered for Kikeh

17 km of Aker Kvaerner Subsea umbilicals were incorporated in the Kikeh development and featured the patented element profiles shown in cross sections above.

Aker Kvaerner's purpose built $100 million subsea equipment facility in Port Klang, Malaysia.

DCV valve assembly in Aker Kvaerner's Port Klang facility.

controls and monitoring with higher data rate retrieval and lower power consumption. Additionally, the iCon SEM accepts a wide range of third-party device input.

For Kikeh, Aker Kvaerner also provided subsea distribution equipment including steel-tube hydraulic flying leads (HFL), electrical flying leads (EFL) and subsea umbilical termination assemblies (SUTA). In combination, the SUTAs , HFLs and EFLs allocate hydraulic supplies and electrical power to the subsea Christmas trees and pressure and temperature sensors.

Kikeh topside controls include a master control station where operators can control the subsea system and monitor reservoir conditions. Additional topside equipment includes a hydraulic power unit (HPU) that supplies adequate and timely hydraulic volume subsea to actuate tree valves and other functions.

Approximately 17 km of steel-tube umbilicals were contracted for Kikeh. This comprised two main umbilicals that were hung-off the host facility and four infield umbilicals plus one transfer umbilical. The Kikeh umbilicals were manufactured to Murphy specifications and included Aker Kvaerner's patented "profile" method that protects the individual elements within the umbilical and extends the product's operational life.

Another First

As a sign of its commitment to the Asia Pacific petroleum sector, Aker Kvaerner opened a new purpose-built facility in Port Klang, Malaysia, just west of Kuala Lumpur at a cost of over $100 million. The new facility opened in April 2007 with over 400,000 sq. ft. under cover. This state-of-the-art plant is the first capable of manufacturing the complete line of subsea production equipment at one location.

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The Kikeh "Hercules" Challenge

In anticipation of the Murphy Oil Kikeh project, Malaysia's first major deepwater development, Frank's International opened two new bases in Labuan, East Malaysia and Kememan, West Malaysia. The infrastructure is now in place with experienced management, seasoned all-Malaysian offshore crews and specialty deepwater operation supervisors from Frank's Casing Crew & Rental Tools' U.S. Deepwater Team. Drew Gardenier, Frank's International Regional Manager for Southeast Asia, coordinated all these efforts.

Where Experience Meets Technology

When you think of Frank's, you immediately think of casing — we're still the leader in casing services. After all "Casing is where we made our name." But over the years, Frank's has transformed from a small casing business into a multi-service tubular company that provides superior equipment and well-trained personnel in the fields of safety, pipe and fabrication, riser fabrication, connector technology, hammers, casing and handling tools, cementing equipment, completion and installation services, and equipment design and manufacturing.

An often overlooked service is one of the most notable services Frank's offers it customers — its ability to design and manufacture custom/specialty equipment. When Frank's opened its manufacturing department in the mid-1970's, each piece of equipment was designed, engineered and manufactured with precision to be durable and dependable. Equipment manufactured by Frank's set the standard for excellence and earned the reputation of being "Frank's Tough". The development and evolution of Frank's engineering and manufacturing departments allows Frank's to maintain the highest standards of safety, efficiency and dependability from concept to completion.

Genesis 7000H

Franks Genesis 7000H Hercules Tong

The New Genesis 7000H Riser Tong — The "Hercules" Tong

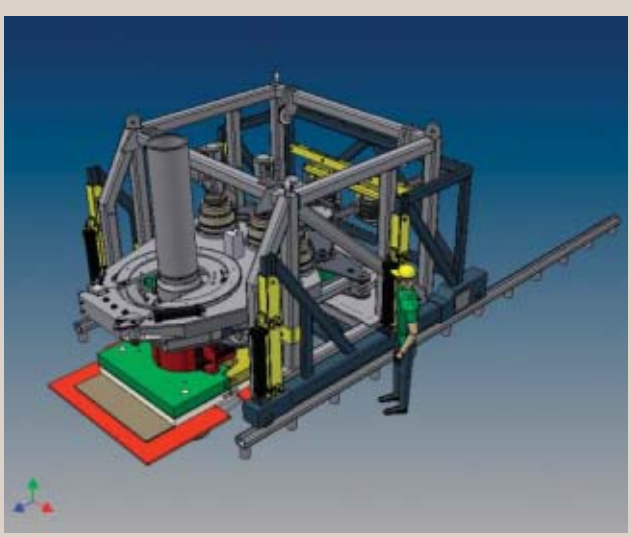
This service was put to the test on the Kikeh deepwater project. "Engineering and building a new kind of large diameter, high torque riser tong for the landmark Kikeh development was a monumental effort — but Frank's Genesis 7000H is in use today and exceeding all expectations," said Dave Helmick, Frank's Manager of Technical Support. The new tong was designed and purpose built for Murphy and is being used to make up their threaded drilling risers. Working under a very short timeline, the tong had to go from concept to a finished project in less than six months. Material shortages and a 300,000 ft. lb. torque requirement only added to the challenge.

The Genesis 7000H, dubbed the Hercules, is track mounted, remotely operated and will accommodate pipe sizes through 25-in. O.D. The unique gripping system exceeds the design requirements for maximum die penetration and torque output specified by Murphy. The rail system was custom built to interface with the customer's spar mounted rig. Make up torque will be monitored and controlled by Frank's Data-Trek Computer System. Mike Webre, Frank's Vice President of Engineering, sums it up best: "This program was a tough challenge, but our people met it — on time and as promised," he said. "The new Genesis 7000H offers operators a significant new tool for deepwater projects."

State of the Art Tubular Handling & Running System

For Kikeh's trend setting driller riser, Murphy chose an innovative, custom designed and custom built handling system to augment their choice of the Hercules tong. They chose a double elevator-shuttle table system with the shuttle table custom built to fit the rotary of the West Setia and hydraulic side door elevators custom built to fit the connector profile of the riser joints. This system also includes a specialized heavy capacity weight compensator and the Stab-Rite.

Also on the project, Murphy chose a variety of Frank's deepwater specialty tools and systems available in Frank's extensive inventory. Frank's stabber-less Stab-Rite system and the FC-1 based Flow Back Tool were chosen for the casing work. For their spar and subsea completions with many control lines and umbilicals, Murphy utilized the Backpacker single joint weight compensator, the Stab-Rite system, and Frank's RS-350 Flush Mount Spider along with the Control Line Positioning System. A Double Elevator System with Shuttle Table and a Frank's 14 3/8-in. High Torque Riser Tong were used for the production riser strings. To enable Murphy to run stands of tubing on their concurrent activity capable rigs, Murphy utilized the Frank's stand enabled, air-powered, remote operated Single Joint Slip Type Elevator system.



Computer Generated Model of the Hercules Tong

More Than 65 Years of Dependable Service

For more than 65 years, Frank's has served its customers with a relentless dedication to safety, quality and dependability. Established in 1938, Frank's has expanded into international operations through a separate company, Frank's International. Headquartered in Houston, Texas, Frank's International has bases in over 50 countries including the two new bases in Malaysia. Frank's and Frank's International both find their roots in the entrepreneurial spirit and dedication of Mr. Frank Mosing, the founder of Frank's. While each is a separate and independent company, the two organizations cooperate on all levels to meet the challenges of the worldwide oil industry. Recently both Frank's and Frank's International were honored as the "Best Oilfield Service Company" in the 2006 EnergyPoint Research Inc. Customer Satisfaction Survey of Drilling and Wellsite Contractors. The independent customer satisfaction survey summed it up best as saying, "Frank's sets the standard when it comes to installing casing and production tubing around the globe."

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Fugro provided critical site and hazard surveys for Kikeh development

The dedicated geophysical survey vessel MV Geo Surveyor, along with MV Geo Eastern, performed deepwater pre-drilling and pre-engineering site hazard surveys as well as acquiring high resolution 2D seismic data in the field.

Fugro played an important role in providing a series of multi-disciplinary integrated consultancy services for Murphy's Kikeh field E&P phases. They involved input from specialized geophysicists, geologists, sedimentologists, micro-paleontologists, foundation engineers, and geotechnical and survey specialists working closely with Murphy's field development design engineers throughout the entire conceptual through completion phases.

Fugro provided numerous surveys, including site hazard surveys, high resolution 2D seismic data acquisition, metocean design criteria, geohazard surveying and foundation-zone assessment, geotechnical site investigation as well as drilling rig, vessel and subsea positioning services. The company continues to support the ongoing field development with high accuracy surface and subsea positioning services.

Geophysical services for seafloor mapping

Fugro performed deepwater pre-drilling site hazards surveys during the initial exploration phase and acquired, processed and interpreted high resolution 2D seismic data. These services were performed by Fugro's dedicated geophysical vessels MV Geo Eastern and Geo Surveyor, the same vessels that were deployed simultaneously for the dual-vessel deep-tow survey operation for the critical pre-engineering survey program. The deep tow system, capable of operating to water depths up to 3000 metres, carries a suite of state-of-the-art survey sensors for acquisition of high resolution, high accuracy seabed topography mapping and shallow geological information.

Metocean services for design criteria

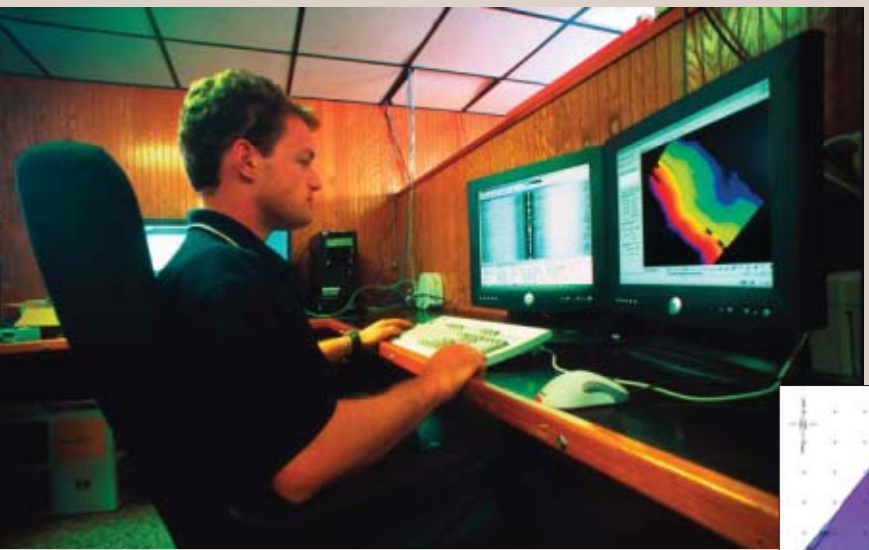
To obtain the metocean design criteria, full profile current measurements were provided to the drilling rigs in real-time during exploration drilling while beginning to accumulate data. When field development was confirmed by Murphy, a comprehensive two-year measurement program was designed and implemented by Fugro that includes wave, current, wind and tide data. These measurements were combined with long-term hindcast data to produce design criteria applicable to tethered deepwater floating structures.

Assessment for foundation zone geohazards

The seafloor, foundation-zone conditions and geohazards assessment provided an overview of the type and general distribution of geologic conditions and inferred soil variations in the field's foundation zone (to 200 m below the mud line). Fugro also provided a preliminary assessment of their potential effects on development. A regional study covered a large, irregularly shaped 600km^2 area. The study was based principally on a review of a combination of high resolution deep tow system (swathe bathymetric, side scan sonar and sub-bottom profiler) data, two separate 3D exploration seismic data volumes and information from two soil borings. More focus was placed on a 70km^2 area subsurface study encompassing the Kikeh wells.

Selected high resolution sub-bottom profiler data and all of the 3D seismic data available were loaded into a computer workstation for interpretation, preparation of seafloor images, final graphics and animated seafloor flyovers. The study provided Murphy with a

The geotechnical drillship SRV Bavenit performed geotechnical site investigations for each infield facility requiring foundation support. They included the drilling tender unit, FPSO, semisubmersible drilling rig, manifolds and riser tieback locations.



Above: High resolution multibeam echosounder, sub-bottom profiler data and all of the relevant 3D seismic data available were loaded into a computer workstation for interpretation, preparation of seafloor images, final graphics and animated seafloor flyovers.

Right: The geohazard survey provided Murphy with a comprehensive overview of seabed topography, features, gradients, geological conditions, seafloor stability, buried faults and gas and gas hydrates.

comprehensive overview of seabed topography, features, gradients, inferred soil variability, geological conditions, seafloor stability, buried faults, gas and gas hydrates.

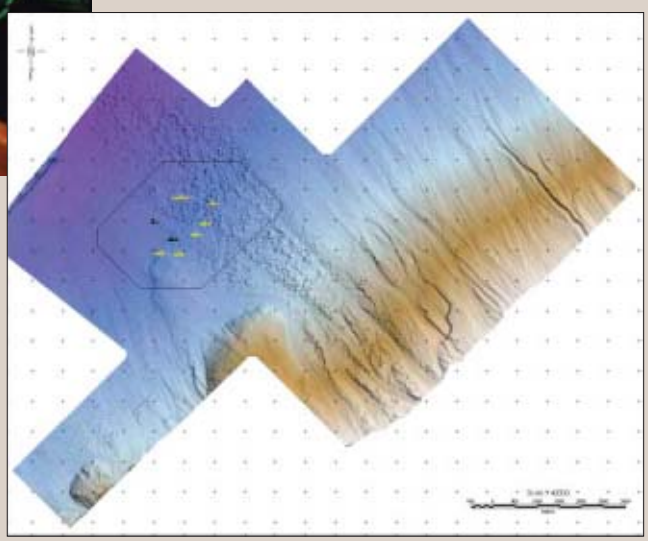
Geotechnical site investigation for each infield facility

Fugro designed and performed a geotechnical site investigation for each infield facility requiring foundation support, including the drilling tender unit, floating production, storage and offloading (FPSO) vessel, mobile offshore drilling unit, manifolds and riser tiebacks. The investigation was performed from the geotechnical drillship SRV Bavenit, a purpose-built vessel operated by Fugro since 1986 and with the capability to drill to depths of 1700m and perform seabed testing to 2000m.

The project scope for each foundation element was different as it was found that soil conditions varied across the site. The following type of borings, samples and in situ tests were performed to depths of up to 80 m below seabed: Wheeldrive PCPT's, Wheeldrive in situ Vanes, STACOR's®, Downhole PCPT's and push samples. During the course of the investigation it became apparent that due to the presence of sands and stiff clays in an interval of turbid-flow deposits at shallow depths (15 m) the suction type anchor solutions would not work for every anchor position. This required a major change in investigation scope moving away from shallow PCPT's and STACOR's® to deep borings for a driven pile design at certain anchor points. Having a dedicated drillship with permanently installed equipment enabled maximum flexibility in this regard and led to a successful campaign of data collection for detailed foundation design.

Providing high accuracy positioning services

Fugro provided rig positioning services to the Ocean Rover and Ocean Baroness semisubmersibles during the exploration phase, utilizing its Starfix high precision GPS systems to achieve decimeter accuracy. To ensure the highest integrity, Fugro operated two independent surface positioning systems. Additionally, Fugro provided multiple support vessel tracking and control from the rig for safe anchoring positioning operations, resulting in fewer offshore personnel required.



During the development phase, subsea positioning services were provided to the Ocean Rover and MV Normand Ivan for the batch set drilling, flying leads installation and tie-ins. Wideband acoustics enabled the vessel, ROV and rig positioning operations to be conducted 2–3 times quicker when compared with conventional acoustics. An array of reference transponders were placed in seabed frames around each development site to provide positioning control to better than 30cm during the development well installation and associated tie-in work.

Fugro

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BJ Services Technology Meets Kikeh Challenges

BJ Services Company proudly supplies coiled tubing services for Murphy Oil Corp. and Petronas Carigali Sdn. Bhd. from the Kikeh spar.

BJ has performed reliable, high-quality coiled tubing (CT) operations on spars from Brazil to the South China Sea. The Kikeh CT operations have been challenging due to the lack of heave compensation in the derrick.

In the first Kikeh CT operation, BJ used its Roto-Jet® nozzle and a 60% glycol solution to remove a hydrate plug between 1110 and 1650 m. BJ's exclusive rotary jetting technology uses less fluid than typical "spray" tools and provides the most effective high-energy pressure jetting for removing tough wellbore deposits. In another Kikeh CT operation, a BJ unit helped displace a drilling riser to corrosion-inhibited seawater.

Beyond CT work, BJ provides nitrogen services aboard Kikeh for pressurizing the marine tensioner system and well dewatering. In the dewatering operations, BJ pumps nitrogen down the risers, displacing brine up small capillary lines. Future Kikeh CT operations will include gas lifting, solids cleanout, fishing, cementing, acidizing and additional services.

Where crane lift capacities limit the size of CT reels, BJ DuraLink connectors offer an economical way to enter deep or extended-reach wells.

The BJ deepwater portfolio

BJ Services offers a range of unique capabilities to deepwater operators. For example, the BJ DuraLink™ CT connector provides effective mechanical means to quickly join two CT strings offshore. Where crane lift capacities limit the size of CT reels, DuraLink connectors offer an economical way to enter deep or extended-reach wells.

Deepwater cementing is another discipline where BJ technologies offer advantages. LiteSet™ low-density lightweight slurries help prevent lost circulation in weak formations and provide more consistent downhole properties than competitive lightweight cements. BJ EnviroSet™ slurries use environmentally acceptable additives that present little or no risk (PLONOR) as defined by North Sea regulations, and BJ is the first to successfully pump a gas-tight PLONOR slurry on the Norwegian Continental Shelf. This technology is applicable in any environmentally sensitive area. BJ XtremeSet™ slurries withstand extreme pressures and temperatures in HPHT wells (where exothermic chemical reactions can change cement properties). BJ pumped an XtremeSet slurry in the highest-pressure deepwater GOM well and BJ experts have developed XtremeSet slurries to perform in bottomhole temperatures to 600° F (349° C) and pressures to 30,000 psi.

Precision cementing requires advanced equipment. BJ's innovative new Seahawk™ twin cement units combine advanced density control with critical component redundancy and unmatched operational flexibility. These high-performance skids improve cementing reliability and provide back-up pumping capacity for emergency well control. Seahawk units use an adaptable, automated mixing system accurate within 0.1 ppg, ensuring precise consistency over a wide range of slurry weights.

Saving time can be critical for cost-effective deepwater completions, so BJ's family of ComPlete™ single-trip systems performs all essential completion tasks with one trip into the wellbore. The ComPlete MST system facilitates gravel- or frac-packed completions across multiple production intervals. It allows flexibility in sand placement, including positive, selective isolation of all zones during completion, stimulation and production, effectively reducing completion cycle time — and cost — by 20 to 40 percent.

Flow assurance is a common concern in deep water. A synergistic blend of thermodynamic, anti-agglomerate and kinetic chemicals in BJ Ice-Chek™ inhibitors controls gas hydrate formation and removes accumulations caused by temperature or pressure changes. Used with methanol inhibitors and equipment, Ice-Chek technology reduces required methanol volumes by over 70% with increased hydrate control.

The insulating properties of BJ InsulGel™ packer fluids protect deepwater wells where shut-ins or other operations may cause paraffin deposition. With greater heat capacity than commonly used gases at shut-in conditions, and lower thermal conductivity than traditional packer fluids, InsulGel fluids minimize waxing due to cooling effects from conduction and convection.

From cementing to completions to well intervention, BJ Services Company offers one of the industry's most complete service packages for efficient deepwater operations.

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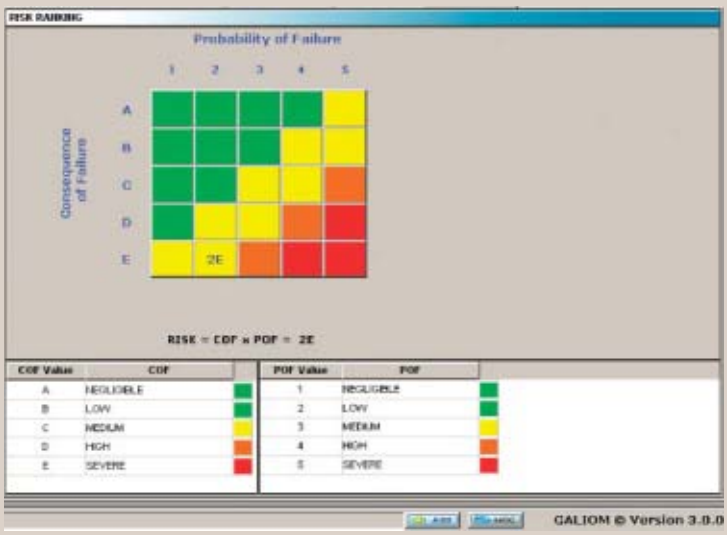
Germanischer Lloyd provides Kikeh's quality assessment and quality control



Green, yellow, orange — and no further: Typical risk grows from the top left to the bottom right. Red indicates the need for repair, replacement or re-engineering of the relevant part.

350 million barrels of crude oil are expected to slumber in the Kikeh field off Sabah, northern Borneo. Deepwater exploration is not exactly typical of the region — nor an easy task. Operating 4,592 ft (1,400 meters) under sea level requires state-of-the-art technology, some of which has never been used before. For example, the project includes the world's first Gravity Actuated Pipeline and the region's first spar platform. In order to maintain the ambitious technology and assure that things run smoothly, independent technical experts are assigned to test and evaluate processes and materials.

For the quality assessment and quality control services of Kikeh, Murphy Sabah Oil Co. Ltd. contracted Germanischer Lloyd GLM SDN BHD (GLM). The German-based classification society acted as Murphy's inspector for the various phases of work that included worldwide vendor inspection, construction and installation surveillance.

Additionally, GLM was awarded the asset integrity management and risk based inspection services for the deepwater offshore facility of the Kikeh field development until 2009. The services rendered by Germanischer Lloyd represent the first all-inclusive implementation of an online asset integrity management and risk-based evaluation and inspection (RBI) system for all equipment, comprising the spar structure, anchoring, pipelines, piping, pressure vessels and safety valves, as well as safety and lifting equipment. Germanischer Lloyd will interface the latest version of its asset integrity management software GALIOM with the existing management systems at Murphy Sabah Oil Co. Ltd. (CMMS, MRP, EDMS, DCS/OFC/DECIDE).

GALIOM is a tool to support a value-preserving service strategy, the objective of which is to minimize the risk for people, the environment, the investment, and the operator's reputation. GALIOM is far more than just a simple diagnostic tool that identifies the presumed state of the process equipment on an oil rig, of the oil rig structure itself and of the pipeline system. The core function of GALIOM is risk-based state assessment. While other systems can monitor corrosion, for example, GALIOM can do more: It can analyze the risk, which is always the probability of failure multiplied by the consequence of failure.

GALIOM includes both a risk-based inspection methodology and a practical asset integrity management process, combined within a user-friendly software package. The API 580/581-compliant tool visualizes the technical and operational integrity status of a facility's assets and includes anomaly assessment and work-scope preparation functionality.

The development of GALIOM began in June 2004 in the GL office in Malaysia, which has been the competence and development center ever since. Gareth Thomas, GL's Global AIM Manager and GALIOM Product Manager, together with Matthews Varkey, the IT Project Manager, combined their talents and knowledge in order to create the GALIOM software ready for release after less than a year. It was a version for integrity management of piping, pressure containers and safety valves.

In early 2007, GALIOM version 2.0 was introduced as an update, and now there are ten more modules on the agenda including Rotating Equipment, Electrical and Instrumentation, and Structures to name but a few. With the further development of GALIOM, currently at version 4.0, Germanischer Lloyd is breaking new ground. Previously, the core business of GL has always been design integrity. Now, asset integrity and operating integrity have been added. The aim is to identify any potential cause of integrity problems in an operating plant early and highlight it before it actually occurs.

At Kikeh, things run according to plan: First oil has flowed. Initially, the field will pump around 20,000 barrels per day before peaking at an average of 120,000 bpd by the end of 2008. Germanischer Lloyd GLM SDN BHD is proud to have been involved in this first deepwater development in Malaysia.

GL OPERATING 24/7

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INTEC provided broad range of engineering services to Kikeh

INTEC Engineering (INTEC), a leading engineering and project management company, provides frontier technology leadership for the offshore energy industry's most challenging field development projects. Established in 1984, INTEC has offices on four continents, including its headquarters in Houston, as well as Rio de Janeiro; Woking, England; Delft, The Netherlands; Kuala Lumpur, Malaysia; and Perth, Australia. This flexibility enables INTEC to execute multi-office international projects providing our clients technical excellence, execution efficiency and local content.

INTEC brings innovative and cost effective solutions from concept evaluation, FEED and detailed design, to construction and commissioning management services, and operations support. Its technical disciplines include offshore field development, offshore pipelines, marine production risers, subsea systems, and flow assurance and operability.

While part of the industry leading Heerema Group, INTEC has maintained its independence as trusted advisors to its clients on offshore oil and gas field development and transportation projects around the world. Our record breaking projects include the first submarine Arctic production pipeline (in Alaska), the longest subsea gas tie-back to shore (in Egypt), the deepest subsea system (in the Gulf of Mexico), the largest FPSO (in Nigeria) and now Kikeh, the first deepwater field development offshore Malaysia.

INTEC's involvement in Murphy's Kikeh project includes flow assurance, preparation of operating procedure for the subsea production systems and DTU system and detailed design review of the field facilities including the gas export pipelines.

Kikeh development execution

In early 2005, INTEC Engineering (SEA) Sdn. Bhd., based in Kuala Lumpur, was awarded a contract by Murphy Oil to provide "Follow-On Engineering" services to the Kikeh project team. Under this contract, INTEC has been deeply involved in Kikeh throughout the execution phase of the project.

The scope of INTEC's involvement includes flow assurance, preparation of operating procedure for the subsea production systems and DTU system and detailed design review of the field facilities including the gas export pipelines. HSE and risk assessment included safety case development; Hazid/Hazop studies; and construction site occupational safety. INTEC also provided HUC coordination; interface management assistance; technical and personnel support to the construction management team.

INTEC meets the challenge of several "Firsts"

The Kikeh project presented numerous challenges to the project team. The project touts several industry firsts and creates an industry model for continued deepwater field development. The DTU is the first Spar installed outside of the Gulf of Mexico and is also the first to use tender assisted drilling (TAD). The Spar deck was installed using a catamaran float over, another first for the Kikeh project.

One of the Kikeh development's unique features and another project first is the Fluid Transfer Lines (FTL) between the Spar and the FPSO (1.6 km span). The FTL is a mid-water steel pipe flowline assembly to transfer produced crude from the Spar to the FPSO, return treated sea water for water injection from the FPSO to the Spar and provide electrical power, controls and communication between the FPSO and the Spar. The FTL system was selected to minimize or avoid hydrate formation and wax deposition risks, slugging and excessive hydraulic pressure losses. INTEC has made significant contributions in the assessment of system operability issues and in developing operating philosophies/strategies to avoid the formation of hydrate or wax at any time during system operation.

INTEC also supported Murphy in developing a gas pipeline to shore through provision of FEED support, bid document preparation and bid evaluation. This support will extend through the execution phase of the project. The 12-in. gas pipeline will allow the produced gas to be monetized rather than re-injected into the reservoir.

To help facilitate a smooth start-up, INTEC will continue to provide technical support throughout commissioning and through the first few months of operation. Murphy and its partners have championed a new vision for reliable deepwater development in Malaysian waters. We're proud to have contributed our expertise to such a dynamic project.

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InterMoor designs, fabricates and installs mooring systems worldwide

InterMoor was responsible for the complete delivery of the Ocean Rover drilling rig preset mooring lines in Murphy Sabah Oil Company's Kikeh field offshore Malaysia, performing detailed engineering, fabrication and installation of the suction anchors. Installation occurred during the first quarter 2006, marking the first-ever use of suction piles for mooring off the coast of Malaysia. The permanent drilling rig mooring system includes a combination of drag embedded anchors and suction anchors, all of which have subsea connectors. The mooring spread includes nine drag embedment anchors and associated preset mooring lines. Water depths at the Kikeh field drilling locations range from 4,200–4,400 ft.

The mooring system was designed to allow relocation of the drilling rig and facilitate drilling operations in an area with complex subsea architecture that includes permanent mooring systems, flowlines, wells and other structures. Because the mooring lines are in place for the life of the field, an offshore drilling rig can efficiently relocate to the field to serve the field's four drilling centers during the course of development.

The tender assisted rig hooked up to the dry tree unit (spar).

InterMoor's continued support in Kikeh field

InterMoor's involvement with Murphy's Kikeh field included more than the design, fabrication and installation of the drilling rig's mooring system. The company also provided design and fatigue analysis of the 84-in. Kikeh spar dry tree unit (DTU) and tender assisted drilling (TAD) driven mooring piles. InterMoor also provided services for the TAD hookup to the DTU, including procedure development and onsite installation management.

Additionally, InterMoor provided offshore crew services for the spar's topside float over and hull integration, mooring pile installation, and Hawser hookup between the spar and the tender assisted drilling unit.

InterMoor provides full range of mooring services

The offshore industry continues to challenge the boundaries of deep and ultra-deepwater, moving to drill and produce in water depths approaching 10,000 ft. The industry's newest rigs can drill in up to 12,000 ft of water. In addition to preset mooring systems, InterMoor provides conventional mooring installation and retrieval, vessel and platform towing, hook up and disconnect, wire/chain inserts and pipeline crossing alternatives.

The company has engineering offices in Houston and Amelia, Louisiana, and also operates two full service logistic/fabrication yards in Amelia and Fourchon.

Vast global experience

InterMoor has vast suction pile and pre-set mooring experience around the world, including many of the industry's largest development projects ranging from semisubmersible drilling rigs to floating production, storage and offloading (FPSO) vessels. Several of its preset mooring projects utilize polyester mooring lines in water depths approaching 7,000 ft. A number of the company's projects involved mooring rigs over pipelines.

InterMoor also provides its patented unique suction embedded plate anchor (SEPLA) that is a novel combination of two proven anchoring concepts. A suction follower similar to a suction anchor is used to embed a plate anchor deep into the seafloor. The suction follower is retracted when the anchor is at the installation design depth, and can be reused to install additional plate anchors. Due to their efficiency, the plate anchors are up to four times lighter than equivalent suction anchors, significantly reducing costs. Additionally, total project costs savings can be greater than 50% even though SEPLAs require use of a suction follower for installation.

InterMoor has also developed a compensated anchor handler subsea installation method (CASIM) that is a safe and cost effective solution for the deployment of a wide range of subsea hardware, including anchors, subsea trees, manifolds, hammers and pumps. CASIM utilizes less expensive vessels for the project, minimizes entangling of rigging, requires less deck space and involves fewer deck operations, thereby increasing efficiency and safety of the operation.

INTERMOOR

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First Malaysian Deepwater FPSO and GAP™ fluid transfer system for the Kikeh field development

SBM Offshore (SBM) supplies, leases and operates floating production, storage and offloading (FPSO) and floating storage and offloading (FSO) units for numerous major oil and gas projects worldwide. The Kikeh FPSO is the largest such unit converted in Malaysia and features the largest external mooring turret ever built. The FPSO was designed and built in 26 months following contract award from Murphy. The contract included the charter of the vessel as well as operation and maintenance of the FPSO for an eight year duration. The 273,000 dwt FPSO has a storage capacity of 2 million barrels of oil. The field's peak oil production is 120,000 barrels per day. SBM was also contracted to supply its patented Gravity Actuated Pipe (GAP™) system for the field.

SBM's Gravity Actuated Pipe (GAP™) system

SBM was contracted for the engineering, procurement, construction and installation of its GAP™ system for the transfer of multiple live produced fluids between the spar Dry Tree Unit (DTU) and FPSO Kikeh over a distance of 1,600 meters. This near-surface fluid transfer system significantly reduces flow assurance problems caused by hydrate formation and waxing. The GAP™ bundle consists of a neutrally buoyant steel carrier pipe supporting steel flowlines and a power/control umbilical. The bundle is tensioned at a depth of approximately 200 meters below the water surface by a combination of chains and weights. Fluid transfer between the ends of the flowlines and the FPSO and DTU is by means of flexible lines.

SBM's patented Gravity Actuated Pipe (GAP™) near-surface fluid transfer system significantly reduces flow assurance problems caused by hydrate formation and waxing.

FPSO Kikeh converted from a VLCC tanker

The former Stena Conductor, which was one of several VLCCs purchased by SBM, was delivered to Malaysian Marine and Heavy Engineering for conversion, outfitting and integration work. The FPSO is owned and operated by Malaysian Deepwater Floating Terminal (Kikeh) Ltd. (MDFT), a joint venture company between Malaysia International Shipping Corp. (MISC) and SBM.

The unit's machinery space provides general services including steam, fresh water, firewater and foam, diesel and power for the accommodation and marine systems. Two 12 Mw steam turbines powered from the vessel's refurbished original boilers provide power for the topside facilities. The boilers were converted to run on both oil and gas.

The FPSO Kikeh's external turret mooring is the largest and heaviest external turret ever built by SBM.

The FPSO's topsides consist of 15 modules and the central pipe rack, which provides all of the interconnections between the various modules, between the modules and the turret, and between the modules and the vessel's systems. Among the modules are high pressure and low pressure separators, centrifugal gas compressors, injection pumps, heating system, gas turbine driven power generators, and seawater treatment equipment.

Largest and heaviest turret built by SBM

The FPSO's external turret mooring is the largest and heaviest external turret ever built by SBM. The external turret mooring provides FPSO Kikeh's permanent mooring. The turret also provides the fluid transfer and control functions to and from the FPSO to the DTU. SBM pioneered the design during the early 1980s and the concept became reality in 1985 when an external turret was fitted to the stern of a 140,000 dwt floating storage and offloading (FSO) vessel. A year later, SBM supplied an external disconnectable Riser Turret Mooring (RTM) system for an FPSO in a cyclone prone region off the north coast of Australia. SBM has supplied forty-nine different types of turrets to date worldwide.

SBM is proud to be involved in this monumental project marking the first converted Malaysian FPSO and the first usage of the GAP™ fluid transfer system.

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Technip's innovative solutions support the success of Murphy's deepwater Kikeh field

Technip was contracted by Murphy Oil Corp. for the engineering, procurement, construction, installation and commissioning (EPCIC) of the Kikeh spar production platform. The contract included the topsides facilities, hull, mooring system and riser and wellhead system for the dry trees. The 12,000 ton spar hull was fabricated and installed within a very tight time frame of only 23 months from contract award to completion of the topsides installation offshore.

Technip's Malaysian engineering center in Kuala Lumpur managed the entire project as well as designed the spar's topsides and provided topsides installation. The Group's subsidiaries in Perth, Houston and Pori, Finland provided support for the project including riser system engineering and the spar hull detailed engineering. Technip continues to assist in the project through its support maintenance team.

Technip provides Kikeh pipeline and riser system

Technip also was awarded the contract for the engineering, design, supply and installation of the Kikeh development area subsea pipeline and riser system. The project includes design, supply and installation of flexible flowlines and risers, holdback anchors, installation of control umbilicals and manifolds, tie-in of the subsea wellheads, hook-up of the risers to the Kikeh floating production, storage and offloading system (FPSO) and pre-commissioning of the system.

Technip's engineering center in Kuala Lumpur managed the overall project and was supported by the company's office in Perth, in collaboration with Subsea 7. Offshore installation using Technip's vessel, Venturer, and Subsea 7's vessel, Rockwater 2, occurred in the second quarter of 2006.

Technip's Deep Pioneer, a dynamically positioned multipurpose deepwater support vessel, also assisted in the project by laying flexible flowlines. The vessel was outfitted with Technip's Portable Pipelaying System (PPS) that was utilized for the first time on the Deep Pioneer in support of the Kikeh project. The PPS is designed to vertically lay flexible pipe and umbilicals and can be installed, dismantled and re-installed on many of Technip's vessels depending upon the particular project and work scope, thus increasing the fleet's versatility.

First open sea catamaran topsides float over installation

The Kikeh project involved the world's first open sea catamaran float over and topsides installation on the deepwater spar. Installation of the 4,000 ton topsides was performed as a single integrated deck, allowing a high proportion of the hook-up and pre-commissioning work to be completed onshore prior to load out. This method significantly reduces the duration and cost of the offshore commissioning phase.

The float over installation involved loading the completed deck structure onto a pair of transportation barges in a catamaran configuration. Once the topsides were loaded onto the barges, they were towed to the ballasted spar at the final production site and positioned around the central column of the spar's hull. The topsides were positioned above the spar and the spar was deballasted, lifting the entire topsides off the barges and onto the top of the spar.

The Kikeh spar's completed topsides were loaded onto two barges in a catamaran configuration and towed to the ballasted spar hull where the barges were positioned around the spar's central column. The spar was deballasted to lift the topsides from the barges and onto the spar.

Technip's success of the Kikeh spar float over installation demonstrates the company's edge in providing technology-driven solutions with competence and reliability. The success achieved in the world's first catamaran topsides float over in open sea proves that the technique can be used for future projects in other regions where access to heavy lift vessels for topsides installation is constrained.

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AIChE: Boost undergrad retention to build talent pool

New online tool helps recruit retirees

Job Profile: Barge rig toolpusher

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Parker Drilling's Tom Bullard

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On the cover: Tom Bullard, toolpusher on a barge rig for Parker Drilling Co., is the subject of PennEnergyJOBS Petroleum Career Guide's first in a series of recurring profiles of petroleum industry jobs. Photo courtesy of Parker Drilling.

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AIChE focusing on undergrad retention to build chemical engineering talent pool

By Bob Williams, Managing Editor

The American Institute of Chemical Engineers (AIChE) is moving aggressively to build up the talent pool of chemical engineers so desperately needed by the petroleum processing and other industries.

Efforts are focused on retaining undergraduates in chemical engineering and stemming the tide of students leaving the discipline, developing and maintaining online and other career development resources, and utilizing retirees to a greater extent in knowledge transfer.

Those are the key strategies for the organization as it moves into its centennial year, according to Larry Evans, 2007 AIChE president and founder and former chairman (until his retirement in 2005) of Aspen Technology. AIChE was founded in 1908 with 500 members. Today it is the world's leading organization for chemical engineering professionals, with more than 40,000 members from 93 countries.

Current state of industry

Evans acknowledges that there is a strong need for more chemical engineers across the breadth of the refining, petrochemicals, and gas processing industries—as well as in other industries.

"My sense is that all firms are becoming more aggressive about staffing and that this will continue in the upcoming year," he says. "The key, of course, is attracting the right number and the right caliber of engineers."

Evans finds it difficult to single out just one critical staffing need for chemical engineers in the petroleum processing industry, given the breadth of industry operations.

"The key for many firms is to think long-term and understand the staffing issues they will face over the next 5-10 years, and to be appropriately prepared," he notes.

AIChE initiatives

Evans is optimistic that "today's energy challenges are likely to capture the imagination of a new generation excited by technological possibility. However, we are not leaving anything to chance, either."

For starters, AIChE is taking steps to encourage improved retention of current chemical engineering students at the undergraduate level.

"The fact is we still have too many students leaving chemical engineering between their sophomore and senior years," Evans says. "So AIChE just launched a program to give all undergraduate chemical engineering students a free membership in AIChE. We believe the exposure they will gain to mentors and to other chemical engineering students and professionals will hopefully help stem some of the attrition."

AIChE's energy-specific initiatives directed at students include some

attractive incentives.

"Recognizing that sometimes the best way to capture a young engineer's imagination is to offer a reward, AIChE is launching a prize competition for undergraduate chemical engineering students," Evans notes. "This competition will ask participants to address one of the industry's pressing technological concerns. Students may compete individually or in teams for one of 24 prizes to be awarded annually.

"Likewise, to encourage more graduate students to turn their interest towards energy issues, AIChE is establishing a number of energy research fellowships. Those selected for the fellowships will focus their efforts on energy-related issues, including those facing the [petroleum processing] industry."

Advice for young engineers

Evans offers this advice to a young chemical engineer considering employment in the petroleum processing industries:

"If you want to make a difference by solving problems that help make the world a better place, then go for it!" he says. "Learn as much as you can while you're in school about chemical engineering, leadership, and world economics. I'd make a special effort to learn more about different cultures. Today's petroleum processing industry is a global business, and ambitious engineers must be comfortable in a multinational and multicultural environment. So use your time at your university to develop colleagues from other nations. That global network could come in handy!"

Utilizing retirees

The AIChE president also thinks that retired chemical engineers can be an invaluable resource in addressing staffing issues in the petroleum processing industries.

"Retirees hold large amounts of tacit knowledge, and it is to a firm's competitive advantage to capture as much of that knowledge in whatever ways it can," Evans says. "Methodologies to capture that knowledge include creating a computer-based expert system around key decision and logic trees; videotaping a retiree discussing how they did a particular job, or made a particular decision; asking the retiree to teach training classes of younger engineers; and having the retiree do actual work part time while assigning a full-time 'understudy.'

"For many experienced engineers, passing on their knowledge and experience in this way can be tremendously rewarding."

How to take the most effective career development steps for a chemical engineer today? "That's easy: work and more work. Gain real experience as quickly as possible and continue to build your knowledge base. In the demanding environment facing engineers today, keeping current and being committed to lifelong learning are a must."

— Larry Evans, 2007 president of the American Institute of Chemical Engineers

Career development

Evans has a simple response to the question of how to take the most effective career development steps for a chemical engineer today: "That's easy: work and more work. Gain real experience as quickly as possible and continue to build your knowledge base. In the demanding environment facing engineers today, keeping current and being committed to lifelong learning are a must."

Evans also recommends that young engineers get involved in leadership activities outside of work early in their careers.

"That way they can develop leadership skills simultaneously with developing chemical engineering skills," he says.

Evans cites AIChE's Young Professionals advisory group and its implementation of special programs at the association's national meetings to help younger engineers gain technical as well as leadership skills.

Given time and staff constraints in the petroleum processing industries today, it's a challenge for chemical engineers to expeditiously pursue continuing education today, Evans acknowledges.

Still, he asserts, "Not all education comes in a classroom. The ability to have the majority of information available anytime, anyplace, asynchronously, makes a big difference in today's educational processes. Universities are reaching out to nonconventional students in unconventional ways, so there are many options if one really wants to learn new information.

"In any case, today's reality is that the onus is on the professional to do so, and our job is to provide the tools and venues that enable them to do it in the manner that's best for their situation."

AIChE career development resources

AIChE offers a wide variety of resources for career development for the chemical engineer, Evans says.

"Today's engineer faces an ever-changing work environment that for many will include periods at both larger and smaller firms and, for some, self-employment," he notes. "Part of AIChE's mission is to serve as the Lifetime Center for professional and personal growth, and we've dedicated signifi-

cant resources to delivering both technical information and the 'soft skills' so critical in today's workplace."

These efforts include face-to-face seminars at national and local meetings and mentoring of young professionals by members who are established in their careers, Evans points out.

"And because we live in a wired world, we've taken our efforts onto the web," he adds. "We're currently offering a series of soft-skills webinars that are free for members but available to nonmembers at a modest cost.

"In addition, we continue to publish technical books, guidelines, and papers. Members who are located at some remove from an AIChE local section can connect through our Virtual Local Section."

Engineers who own their own businesses, as well as those who work in commercial firms, can use tools such as the AIChE eLibrary to level the playing field, says Evans. In addition, members have access to a suite of career development tools from CareerTools Plus.

"So if the member is willing to make the effort, we can provide them the tools they need to help them succeed," Evans says. "Any of your readers who are interested in the details should visit www.aiche.org." ◊

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Parker Drilling's Bullard: People skills key to toolpusher's success

By Bob Williams, Managing Editor

People skills and the ability to manage personnel are critical to a toolpusher's successful job performance, says Parker Drilling Co.'s Tom Bullard.

And those skills are especially important while taking on the responsibility for everyone's safety in a hazardous working environment.

Bullard is toolpusher on Parker's Barge Rig 77B, which is the newest rig in the drilling contractor's Gulf of Mexico fleet and currently operates in ultra-shallow and open waters in the gulf. The barge rig, with a drilling depth capacity of 30,000 ft, is specially equipped for drilling high-temperature/high pressure wells. Because of the extremely high temperatures and high pressures encountered downhole, the risk of tool or even well failure is high, and that raises the risk for dangerous situations compared with drilling conventional oil and natural gas wells.

But that's icing on the cake for Bullard: "I love the challenge of managing a drilling rig that is drilling deep, critical wells."

Bullard, who says he also enjoys the schedule of working 7 days on and 7 days off on a barge rig, has been with Parker Drilling for 20 years. Overall, he has worked on offshore rigs for 31 years.

What a toolpusher does

In short, a toolpusher has a big responsibility, overseeing all operations on a drilling rig.

A less colorful title would be rig manager; on some offshore mobile drilling rigs or drillships, he's known as head of the drilling department.

The toolpusher hires and manages the entire drilling crew, plans schedules, and makes sure that the rig meets all safety requirements. Toolpushers also are in charge of keeping the rig provided with all needed tools, equipment, and supplies. In addition, a toolpusher will engage third-party companies for specialized drilling support services.

Typically a toolpusher works closely with the drilling superintendent of the company operating a well, coordinating the drilling plan and execution. He also serves as the liaison with any operating company personnel or other visitors to the rig.

The job in recent years has evolved from that of a "rig boss" to more of an administrative role, "pushing paper" as much as pushing tools, i.e., paperwork related to payroll, benefits, and the like.

Although a toolpusher typically directs drilling operations from his office, he also must be prepared to fill in on the rig floor if needed.

Toolpusher qualifications

Typically, a toolpusher is someone who has started as a roughneck or roustabout on a drilling crew and has worked his way up through the ranks.

Experience is essential to becoming a toolpusher. No drilling contractor would entrust the safety of a rig and its crew to someone without adequate experience on drilling crews—4 years' worth, at a minimum, including a stint as a driller.

That kind of experience and understanding of all drilling operations and activity on a drilling rig is needed in order to direct and monitor drilling operations ranging from move-in and rig-up to rig-down and move-out.

A toolpusher should be level-headed, quick-witted, have common sense, and show a real dedication to safe working conditions.

Safety is Job No. 1 on every drilling rig. There are always risks of falling or getting snagged by or hit by equipment, and the industry must follow the strictest of occupational safety and health standards. In the event of an accident or an emergency, it falls to the toolpusher to secure the well and the rig and ensure the safety of everyone on the rig, including organizing and controlling evacuation of personnel.

A toolpusher also must be well-organized, due to his responsibility for delegating and scheduling a wide variety of tasks that arise during drilling among roustabouts, roughnecks, drillers, and other derrick hands.

Although a college degree isn't required, it's expected that a toolpusher have some basic mathematics and physics knowledge in order to anticipate and deal with the huge and sometimes unpredictable physical forces and downhole conditions encountered in drilling a well several miles below the earth's surface.

"Personally, I would recommend setting your goals higher than you can reach, always having a plan, working as a team member, and having a strong sense of responsibility."

— Tom Bullard, Parker Drilling Co. toolpusher

Organizational and math skills also come into play for a toolpusher in setting up a drilling schedule and then dovetailing work shifts with that schedule.

Another crucial aspect of a successful toolpusher is good communication skills. A rig crew must be work as a well-oiled machine, so clearly communicating instructions is important for sustaining efficiency and avoiding accidents.

Physical fitness and stamina also are important in a toolpusher, given the occasional need for getting on the rig floor to lend a hand.

Being away from home for long periods of time is one drawback to the job. Although some rig workers working in the Gulf of Mexico might be on duty 1-2 weeks and off the same, with home just a short plane ride away, rig workers in overseas operations might not see home for months at a time.

In the end, leadership qualities and a dedication to safety are what drilling contractors look for most in a toolpusher.

Bullard's take

In Bullard's view, a toolpusher's qualifications and responsibilities include the following.

"A toolpusher:

- Maintains a safe working environment.
- Plans various rig activities such as repairs, daily maintenance of drilling fluids, rigging up or down, etc. Sees that activities are coordinated efficiently.
- Coordinates safety meetings and pre-job safety meetings.
- Must have excellent well control skills.
- Sustains the upkeep of rig equipment and suggests improvements.
- Maintains the paperwork (including morning reports, IADC daily log report, etc.).
- Keeps the superintendent updated on operations; inspects for hidden hazards; inspects lifesaving equipment and safety equipment.
- Coordinates rig move with staff.
- Plans job repair and maintenance; orders rig supplies, parts, and materials.
- Is responsible for compliance with all government regulations.
- Must be able to perform first aid/CPR."

In addition, being on a barge rig takes it up a notch, according to Bullard:

"Toolpushers on barge rigs work with a smaller crew than toolpushers on other offshore rigs and therefore have greater responsibilities in keeping crews on board safe, alert, and focused on their jobs."

During a typical work day for Bullard, he would be:

- "Having a meeting with all employees to discuss the tasks that we are facing and how we will accomplish those tasks in a safe and productive manner.
- Discussing well and rig issues with the operator's representative.
- Keeping all personnel issues taken care of.
- Always seeing that everyone is doing their job a safe manner."

For Bullard, the biggest change for toolpushers today compared with how the job was conducted in the past is that "toolpushers [today] do much more personal training with crew members due to fluctuating personnel."

Noting that toolpushers generally have worked their way through the ranks of a drilling rig crew, Bullard offers this advice to anyone considering a career as a toolpusher:

"Personally, I would recommend setting your goals higher than you can reach, always having a plan, working as a team member, and having a strong sense of responsibility."

For a good long-term career goal, Bullard recommends "working with a well-established company that continues to grow, trains, and provides opportunities for their employees. That's a true strong statement!" ◊

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New online tool helps recruit retired oil personnel for occasional work

By Bob Williams, Managing Editor

A leading executive recruiter in the petroleum industry has developed a new web-enabled software and database designed to more fully utilize the large and growing talent pool of retired oil and gas professionals.

The Expert Alumni service is intended to tap the sorely needed knowledge and hands-on experience of oil and gas industry professionals who have retired from the industry but still want to stay involved to a limited degree—in particular not wanting to return to permanent employment. With the prospect of half of the petroleum industry's geoscientists, engineers, and other professionals looking to retire in the next 5–10 years, such a service is seen as an attractive solution to the much-talked-about "brain drain" that already is hobbling the industry today and is expected to worsen in the coming years.

Jon Glesinger, principal of The Glesinger Partnership Ltd., London, describes the Expert Alumni service as a profiling software designed to capture the "career DNA" of retired petroleum industry professionals. Easily navigated and customizable to be as complex or as easy as the professional wants it to be, Expert Alumni helps the retired professional create a profile that details not only expertise and experience but also his or her preferences for limited work engagements. This provides a comprehensive tool that allows the Glesinger executive recruiting consultancy to match the right retiree with oil and gas operating and service/supply companies' temporary or limited needs—from mentoring individuals to managing projects. It also serves to help develop an expert faculty for training and certification of professionals in various disciplines.

Expert Alumni

Glesinger maintains that Expert Alumni is really all about creating and managing data.

Glesinger on new web-enabled profiling tool: "What we're doing with the Expert Alumni technology... will effectively be able to profile a career DNA."

"We're just doing it in a more complex way than what we really do in the headhunting business," he says. "I'm not decrying the industry at all, because while Expert Alumni is doing what it says 'on the box,' we also have the Glesinger Partnership, which is doing some headhunting, so it's still a good business."

In a conventional "headhunting" exercise, the executive recruiter charged with a search would seek a professional who is already working at the kind of position that needs to be filled.

"Now that person's background is obviously important, but it's not a critical factor in the top end of the search; it's not my main criteria what you could do 20 years ago, it's what your doing currently that's interesting. The complexity of [a typical executive] search mechanism is pretty much nonexistent.

"But what we're doing with the Expert Alumni technology...will effectively be able to profile a career DNA, if you will, so we've all got our career footprint."

Glesinger gave as an a example a new plant manager at a refining complex in Baytown, Tex., who's been promoted "a little too quickly" and needs some hands-on guidance.

The client might say, "We're looking for somebody who can actually understand what's going on with this guy rather than, 'Oh, yeah, here's a fellow who's been running a plant for 20 years,'" Glesinger offers. "It might not really be a good match, or he might not really know what's going on, so we're putting a lot of things in place that will help clients be much more discerning about who they're actually going to be hiring. And, of course, we're hoping the candidates themselves will be more specific about what they want to be doing now that they're not working full time and possibly don't have to."

Typically, a fresh retiree seeking to continue part-time and/or occasional work would use the Expert Alumni online database to register himself and produce a profile as complex or as uncomplicated as he prefers. Client companies would contact The Glesinger Partnership to recruit a retiree for temporary or part-time assignments. The consultancy in turn searches the Expert Alumni database to pinpoint the right candidate and then connect client with prospect.

"It's very much like a recruitment thing at that level, but it's also managing people's interests and desires to determine what their work pattern is going to be: This is X, actually, he doesn't do Mondays, and he plays golf on Fridays, so during the 3 days in the middle, what do you want?

"We can look at career DNA. We'll also be storing information—again,

as complicated or easy as you'd want—things like, 'Do you still go to SPE meetings?'"

The Glesinger Partnership has been in talks with the Society of Petroleum Engineers about working together to add further detail and credibility to the Expert Alumni database professional profiles.

Mentoring

Glesinger's consultancy also has been working with Robert Gordon University, Aberdeen, and Rice University, Houston, to provide mentoring accreditation at distance- mentoring facilities.

"Robert Gordon University has a lot of technology and experience and capability to provide for this sort of distance-mentoring; they also have a mentoring and accreditation program," he says. "For example, if you were looking at twin brothers with identical experience and you want to mentor them, say that Brother A is accredited and Brother B is not—now you've got two choices."

Glesinger on the Expert Alumni recruiting target: "The boomers who are retiring now from the majors are financially independent, but they may have an affinity to go back to work. It's just that they're not going to back on the same terms to do the same job with the same company. This is where the system works nicely, where the guy who's worked 30 years at Halliburton or Shell doesn't necessarily want to go back to Halliburton or Shell and just carry on where he left off. But he might have huge value for another company in a reduced capacity and in a slightly different job that takes advantage of his career experience rather than being the product of the last book that he wrote. He's the product of his entire career."

Mentoring training is partly classroom-based and partly online, Glesinger notes, adding that Robert Gordon University has developed some criteria by which to measure potential mentors, "as educators know how to do." SPE also has an electronic mentoring program.

Other organizations developing mentoring accreditation include the London-based Energy Institute, which is working with Glesinger and recently named him a Fellow on the basis of a study he did on the effects of the aging workforce on the oil and gas industry's leadership.

Glesinger takes pains to differentiate mentoring from coaching.

"Coaching is a lot like counseling, and it might include elements of mentoring. But mentoring has a lot more to do with specific on-the-job training, such as 'Don't touch that button, it's dangerous' or "When I was faced with this situation back in days when we were trying to prevent Thunder Horse from falling over, if we'd done the following things, it might have been different, so you might like to think about those things."

In short, mentoring has more to do with direct, hands-on sharing of experience.

"[It's] not necessarily teaching, although I think that is a direct outcome," Glesinger adds. "I think it has more to do with providing a shoulder to lean on, the place to go to for advice, and the person to go to who can say, 'Do you really think that's a clever idea? Or, 'Yeah, that's fantastic.'"

Mentoring is growing in importance for the oil and gas industry because of the tremendous value offered by retired professionals who come back into the workforce.

"I won't be so dramatic as to say that the industry can't possible survive without these people, but it sure is going to be difficult," Glesinger says, citing a recent Cambridge Energy Research Associates study that pointed to skills shortages and burgeoning retirements of professionals creating a major stumbling block for a lot of projects going forward, high project cost overruns, etc.

"Mentoring is an important part of what we're providing with Expert Alumni."

Part-time and temporary engagements

The Expert Alumni service also provides clients with the opportunity to locate professionals with just the right kind of expertise in high-need temporary or part-time assignments.

"If someone at Total [SA] comes to me tomorrow morning and says, 'I need someone to go to Tulsa, Okla., to just run through some labor relations stuff for 3 days next week, what have you got'—then we can do that.

"The focus is more on the people and the time rather than the pure contractor mentality, which is different. If I want to contract you a scientist, I'm going to give any number of [candidates] a call, and I'm going to get someone under contract. Those people I consider mainstream workforce, whereas the retired people, they've got a different view on life. "This is where the baby boomers meet Generation Y. The baby boomers say, 'I want to do what I want when I want and how I want,' and they'll have the means to do it. The Generation Y types are going to run out of cash. The boomers who are retiring now from the majors are financially independent, but they may have an affinity to go back to work. It's just that they're not going to back on the same terms to do the same job with the same company.

"This is where the system works nicely, where the guy who's worked 30 years at Halliburton or Shell doesn't necessarily want to go back to Halliburton or Shell and just carry on where he left off. But he might have huge value for another company in a reduced capacity and in a slightly different job that takes advantage of his career experience rather than being the product

Jon Glesinger is a principal in The Glesinger Partnership executive recruiting consultancy and is the developer of the Expert Alumni web-enabled career profiling tool for oil and gas industry retirees.

of the last book that he wrote. He's the product of his entire career."

The lack of complications over benefits and pay are part of the real value that Glesinger sees for his clients in taking on retired professionals for temporary or part-time assignments,

"Retirees have their own arrangements," he says. "Their benefits and pay are much less complicated because they're independent. The nature of the benefits they're looking for is quite different. In a lot of cases, they already have their pensions and their medical care taken care of. It's a lot less complicated than hiring people directly."

Company-directed databases

The other major area where Expert Alumni is going to provide service is directed to companies who want their own alumni database.

"Basically what we can do is effectively replicate the Expert Alumni database or its technology, and we can 'own-brand,' if you will, let's say, for Halliburton, Shell, ExxonMobil, or Schlumberger," Glesinger says. "Very few of these companies have extensive alumni databases, and we can put that technology to good use. We can provide them with consulting services so that they can understand what they're actually trying to achieve through this. We can provide them with web-enabled software solutions that will be a corporate alumni database that either can or doesn't link into Expert Alumni. So you can have this big central database and all these little satellites around it, providing companies' access to their own [pool of retired personnel]. So you don't have to come to us; you can set up your own thing."

Early feedback on Expert Alumni has been extremely positive, says Glesinger. Although he wasn't set up to undertake assignments for Expert Alumni just yet, one client had two immediate opportunities.

Another client found the concept ideal for setting up training centers of excellence around the country: "They don't have enough people to do it, they don't have the people to set it up, and they need a flexible workforce to run one full-time course. You would probably need three part-timers, and you would need to schedule that, so that was a slightly different application. The database is set up so that we can handle the scheduling. That might well turn into a headhunt as well, because they would need a full-time senior manager to run the program."

The other aspect to consider is the difficulty that companies in Europe and the US encounter in bringing their own former employees back into the fold under temporary or part-time arrangements because of legal complications over tax and benefits issues.

"The difficulties [with tax and benefits issues] are not insurmountable, but it's not a slam-dunk, either, so again, we're providing a service in that area."

Teaching faculty

Another initiative Glesinger is undertaking with Expert Alumni is a Houston-based effort to provide a supply of professionals with the right mix of expertise and capabilities who can be developed into a teaching faculty for technical training purposes.

"There aren't enough people in education now, and the retired fraternity

provides a unique and ideal talent pool because they have knowledge and experience, and they've got the desire because they want to get out of the house and do something different from playing golf, but they don't want to be in a high-pressure job every day. This sort of transfer of knowledge is fantastic.

"We've been asked about people who would be interim managers—'Is there someone on the Expert Alumni database who can go here and do that for a little while and then stop?'—to set up a special program or set up a new department somewhere without some of the long-term effects or the complexities attached to just adding more contractors."

Adaptability

Glesinger thinks that Expert Alumni will quickly evolve into a multi-sector product because "it's not just the energy sector that's affected by the aging population, it's every sector: automotive, IT, construction—the guys who have all the experience are baby boomers who are looking at retirement."

Glesinger says his consultancy is already looking to expand Expert Alumni into other business sectors now.

In addition, Expert Alumni can provide additional profile services to existing member communities of other organizations such as SPE and the Energy Institute.

"There are ways we can enhance [profiles of] members of Expert Alumni with other things, keeping them up to date with information about other things so that you've got more of a single place to go to manage work-

related stuff, like, 'Am I up to date with the latest papers that are coming out of the institutes,' or 'Am I attending training opportunities?'

"The sky's the limit; if the membership is big enough and willing enough, they may well be interested in other products and services to boot."

Foreign personnel

Glesinger doesn't see significant relief to alleviate the petroleum industry's shortage of skilled staff, as is speculated in some quarters, coming from rapidly developing countries with large populations of well-educated technical professionals.

"Some consulting firm said, 'We've got to wake up to the fact that there's a lot of talent in China, India, and Brazil, and we should go and hire them,' but it's not really that simple," he asserts. "You're in competition with the indigenous workforce and the indigenous companies, which is quite political to start with. While some people do aspire to work for western companies, I think we need to get over ourselves a little bit and realize that's not necessarily the case. Not everybody wants to work for western companies and their western ways because they may just not want to—anymore than we'd necessarily want to work for, say Petrochina or Reliant.

"It's a very different world. I know a very senior guy who went to work over in India and found that it's so wildly different culturally—not just the country but the corporate culture as well—that it was beyond his wildest dreams and imagination. Once the honeymoon's over, suddenly it's not his wife's cup of tea, so she's going to move back to England. What started out as a great idea and a fine adventure for a little while, now he's...suddenly finding himself in very awkward situation and thinking, 'Well, I'm not sure I want to do this.' How much of your retirement are you going to want to do that?

"So I don't think we're going to find that all of these foreign workers will suddenly come into Europe or North America—not to mention the immigration issues that we're facing that still exist. The NOCs [national oil companies] are as interested in the baby boomers as much as the IOCs [international oil companies] are."

Glesinger adds, "We'll be providing a service that will appeal to the Indias and the Chinas as much as it does the Americans and the Brits."

Expert Alumni rollout

Glesinger at presstime in October was in the process of rolling out the launch of Expert Alumni and expected to have an online presence by early November and to be fully up and running by yearend. The website address will be www.ExpertAlumni.com. Retired professionals at that time can start creating their own profiles.

He promises that the website will very easy to navigate and that developing a profile will be a straightforward process.

"Compared with other job sites, an important feature is its simplicity and ease of use," he explains. "It can go very deep but isn't very wide. People sign up to be available in the way they want to be available."

Glesinger isn't concerned about competition from other, established job search websites that offer extensive CV data access at a low cost.

"It may seem cost-effective, but people these days are so pushed for time that they don't have the time to troll through the entire database," he contends. "You have a lot of potential applicants, but you don't know whether any of them are any good. If you're a staffing guy and you're already short of time, you definitely don't have time for doing more.

"We're offering a graduated service. There are assisted and super-assisted services...We're offering people the opportunity to say, 'Take care of this for me and just give me a short list,' and we will deliver the goods."

Using the focused approach that Expert Alumni offers also will help avoid the problem of the talent candidates being deluged with e-mails from a lot of companies, Glesinger adds:

"It's still a high-touch service, we're not just automating everything."

The consultancy will be incorporated in Houston as The Glesinger Partnership Inc. and in London as The Glesinger Partnership Ltd., while the web-enabled profiling services will be known in Houston as Expert Alumni Inc. and in London as Expert Alumni Ltd.

Prior to forming The Glesinger Partnership, Glesinger headed the oil and gas branch of UK-based executive search firm Norman Broadbent. ◊

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Recruiter: Staff shortage fix requires petroleum company leadership

By Bob Williams, Managing Editor

Fixing the U.S. petroleum industry's staffing problems will require leadership from oil and gas companies, according to one of the industry's leading executive recruiters.

At the moment, that leadership is lacking, said Mike Ayling, president of Tulsa-based MLA Resources Inc. (www.malresources.com).

Ayling, involved in the personnel recruiting business since 1975, founded MLA Resources in 1981 and is its president. He previously was a personnel director for an integrated international oil and gas company.

Ayling specializes in recruiting geologists and geophysicists, and, to a lesser degree, petroleum engineers, landmen, and computer support technicians. He also conducts annual salary surveys for the American Association of Petroleum Geologists (AAPG) and Society of Petroleum Engineers.

Recruiting tools

Demonstrating leadership and commitment is the best recruiting tool for securing skilled professional talent in the US, although that is not the preferred tool being used by oil and gas companies today. says Ayling.

"The tool that's being the most used is money," he said. "I've regularly seen salaries for 20+-year people in the $150,000-160,000 range. He also recently heard from a fellow recruiter of an individual being offered $250,000—for a staff job.

"So simply buying what they can't produce themselves seems to be the most expedient choice. I'm not sure that that's the most effective way to do things. When you start talking about salaries at that level, money—even with the somewhat better tax policy now—becomes a bit irrelevant."

Ayling contends that the best way for US oil and gas companies to attract quality candidates for a geoscience or engineering position is "some confidence that the company that they're going to work for is going to stay around. And some sense of mission that is not just verbally communicated but is communicated by action.

"Everybody likes to be part of a winning team, a team that's doing something and accomplishing something. And the people who I talk to that aren't interested in changing jobs are the ones that feel that that's the case where they are."

According to Ayling, it isn't a question of whether or not a skilled technical professional can earn more money somewhere else, it's a question of "am I convinced that what I'm doing is really going somewhere, that these people are in it for the long haul—or that this is a company where the stated goal is to build it up and then sell it in 3 years."

Ayling tells his clients that while paying a competitive salary is necessary,

they need to convince prospective recruits of their commitment by their actions, not their words.

"You can talk all you want. But if you are committed to moving forward and exploring and finding oil and gas, and they feel that they're a part of it and that their decisions and input are valued, and that they're a valued member of the team, then that goes a long, long way."

Industry image

Ayling acknowledges that one of the hurdles for a recruiter in the US these days is dealing with the industry's negative image.

"[When it comes to recruiting], you can talk all you want. But if you are committed to moving forward and exploring and finding oil and gas, and they feel that they're a part of it and that their decisions and input are valued, and that they're a valued member of the team, then that goes a long, long way."

— Mike Ayling, president, MLA Resources Inc.

"A lot of the guys that are teaching at universities are guys that got laid off in the industry, and they've got a pretty negative attitude towards the industry, and that doesn't help," he said. "I think that you need to send some of the big guns, some of the famous people in the industry, out to these universities and talk to the students, talk to them realistically about what sort of future there is in the industry. I think the industry itself has not done a great job at doing its own publicity about itself."

Another issue is the broad public perception that the petroleum industry is not environmentally friendly.

"The industry has reputation of not caring about the environment, and I think that that's really unfortunate because it's not true," Ayling said. "For the most part, they do care about the environment. If the industry did a better job of publicizing what it does right, instead of trying to hide when it does something wrong, then it would help."

Another issue frequently cited as a hurdle for attracting young people to the industry is its historical boom-and-bust cycles. But cyclicality isn't an issue in recruiting seasoned professionals, Ayling contends.

"I don't think that people are concerned about cyclicality in the industry right now. Even if the price of oil were to plummet to $40/bbl, that's a whole better than $17," he said. "In terms of cyclicality—in terms of people—most companies are absolutely desperate for people. There aren't any.

"So many people have left the industry, there are so few young ones coming into the industry, and there is so little training going on in the industry, that most people are not concerned about whether they'll be able to find another job. A large number of them really don't think that this [up cycle] has to last very long, because they're close to retirement anyway. A guy 54 years old isn't looking for another 30 years.

"The average age of a geologist is close to that 54 right now, and for a petroleum engineer, I'm sure it's not too much different.

But the industry's negative image nevertheless remains a hurdle for attracting young talent to its ranks—a view underscored by the dearth of university students on an oil and gas career path.

"I was at the AAPG convention last spring, and I walked back one evening with a young guy who was a student from the University of Texas," Ayling recounted. "I was rather impressed when he told me that they had 200 people in the geology department. Then I found out that almost half of them were foreign. And almost another half of them are interested only in environmental geology. And that got the number down to maybe 50, and

that was spread among 6 years of study...That's a drop in the bucket.

"The other serious problem is that when these young people come out of school, there's nobody there to train them."

Training a geologist is especially difficult because it is an interpretive science, Ayling noted.

"You certainly don't want people to overlook data, and there are some things that can be trained, like how to draw a map. But [stimulating] the ability to see the forest for the trees, the ability to recognize a prospect, [while avoiding] the danger of crushing somebody so that they quit recognizing prospects, that's a bit tricky. For an engineer, it might be a bit more straightforward."

If he were to advise a young person to pursue petroleum geology as a career, Ayling said he would first question the person's underlying motive.

"If they said they liked solving difficult problems acting on a limited amount of information, and they really liked the challenge of understanding how the earth produced petroleum, I'd encourage them. If they said they wanted to be a millionaire, I'd tell them they might want to try to become an investment banker instead.

"I think that there are people who flat fall in love with the idea of looking at rocks and finding oil and gas, and they're the people who are going to find your oil, and they're the people you want in the industry.

"I could tell them that I think that there's going to a demand for oil and gas well into their lifetime, that it's always going to pay well for people who can find a scarce resource, that it will be challenging, and that it will be multidisciplinal. But they ought to figure out whether or not they can think and envision in three dimensions. Because it is the one thing that is absolutely necessary—I'm not sure you can do it without that capability."

Recruiting in foreign countries

The veteran recruiter doesn't see a real solution in recruiting candidates from other countries, citing what he contends are common cultural differences that make for a difficult fit in the U.S. petroleum workforce.

According to Ayling, Americans have an advantage over their non-US counterparts that go beyond education in that, being more grounded in their approach to problem-solving and gaining a broader exposure to the disciplines they've studied, they seem to be more capable at solving practical problems in geoscience and petroleum engineering.

"You take a guy from West Texas or West Virginia and you educate him about oil and gas, and he brings an American ingenuity, a type of work ethic, and a variety of other things to the job that [professionals from other cultures] don't bring. I don't mean to be jingoistic in saying that, but that's part of the problem.

"[Americans are] problem solvers. It seems that that's one thing that, going back generations, has been built into the way that we approach life."

Ayling also sees advantages Americans have in the US industry in terms of their ability to communicate—not just in terms of their linguistic skills, but in terms of their innate forthrightness that isn't shared by other cultures.

"Some societies don't reward people for being as candid as I am," he joked.

Difficulties in obtaining work visas are another challenge for US oil and gas companies recruiting from abroad, he added.

While he doesn't see foreign recruiting as a solution to industry's staffing woes, that's not to say that American oil and gas companies can't find quality technical staff in other countries, Ayling demurred: "You could get bring in some people from overseas and get them visas and train them to work here, and they'd be very happy to stay here and work at the high salaries we have to pay people and probably do a very good job for you—if you pick the right ones and if you spend enough time training them."

Training critical

Industry's staffing shortage has become so severe, Ayling contends, that it is creating a corollary problem for the people who are being hired: a lack of training.

"All of the chief executives are saying, 'Our No. 1 problem is people, but I haven't seen anyone adapting this strategy: That you have to hire enough extra people so that your people have enough free time that they can train others. And, instead, what [companies] are doing is that they're running so lean that they can't [have time to train others]. A guy working 60 hours a week can't train somebody; in fact, he can't train himself."

Ayling recounts a conversation he had about 10 years ago with a chief geologist for a large independent producer, who complained about his lack of success in convincing his staff to take training course.

"I said, 'Well, man, I can explain why: They're working 60 hours a week. Who in his right mind is going to take off 2 weeks to go to a training class and come back and have to work 80 hours a week for the next 6 weeks just to get caught up?' You can't train a bunch of young people when you're trying to do that, when there's more work than you can do already. It takes away from your efforts to train others, to do it right.

"And you also can't train them by sitting them down at a computer and telling them to find oil. You've got to build in some slack. You've got to build in time for them to go out and sit at a well and watch it get drilled and realize what happens and what sort of information comes out of the ground and what its flaws are, because [petroleum geology] is still an interpretive science.

"And I guess petroleum engineering is a tad easier, but it still has some of the same problems. You can't take a fresh kid engineer and send him out to drill a 15,000 ft overpressured or underpressured well and expect him not to kill somebody. You have to send him out there with somebody who knows what he's doing, and that means you've got two guys out on the well."

"So I think we've got ourselves a mess, and I don't know how we're managing 1,700 rigs [in the US]."

Part of the solution, said Ayling, calls for getting people who have been out of the industry for the last 5-10 years back into the industry.

"They didn't forget everything they learned. They could help fill the training gap. Or they could ease the workload of other people to help fill the training gap, if they have the right kind of personality. It takes a particular kind of person to be an effective trainer."

Company leadership needed

It all boils down to leadership at US oil and gas companies, Ayling says. Ayling sees what he terms as a "leadership vacuum" at many of the larger oil and companies—a condition endemic in the American business world at large.

"So many of these people have risen to the top not by being leaders. They've risen to the top by being good politicians. There's a big difference between a leader and a politician.

"There are an awful lot of people that have done very well in this industry that I think owe it something—like going out to schools and telling kids what sort of rewarding career they can have in the oil industry.

"[They should] tell them that if all they want is to do is make $150,000 a year, then that isn't the way to do it. I'm firmly convinced that people shouldn't work to make money, they should work because they love what they're doing."

In addition, an unhealthy emphasis on short-term profitability makes it difficult to "convince a team of people sincerely that you have a plan of action and that you're going to follow it."

By way of example, Ayling related an anecdote about a geophysicist friend at a small privately owned company in Texas that had conducted extensive seismic work on a salt dome and drilled a well with poor results. The company reprocessed the seismic data based on the information they had and drilled a second well with better results. The third well was a company-maker. Ayling's geophysicist friend told him that if the company had been partners with a public company or had taken any public money, "We'd have been out of there after the first well."

Ayling contends that another piece of advice that the petroleum industry's leaders should give students is that the old standard of lifetime employment and career advancement at one company has been discarded.

"Rising in the corporate ranks is a futile effort today," he said. "It probably always was, to some extent, but people more and more are realizing that that's maybe not what they want to do.

"But there's still an awful lot of opportunity in the oil and gas industry for geoscientists and engineers who don't want to rise in the corporate ranks. [At the outset], everybody thinks that they're going to go to work for a Texaco, and that's where I'm going to work for the rest of my life, and that almost never happens. There are more and more people making a living in the industry as consultants—and a very good living. There are more and more opportunities for people to work for small companies and to be part of a team that is committed—that isn't being run by a Harvard MBA who decided to adopt a 'K-Mart approach' to staffing. But that message doesn't get across very well." ◊

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— Mike Ayling, president, MLA Resources Inc.

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Aussie study shows learning-conducive workplaces key to developing oil sector skills

By Bob Williams, Managing Editor

Developing leading-edge skills in the oil and natural gas industry depends on the fit between the opportunities for learning by companies and the motivation of workers to pick up on those opportunities.

The key is for oil and gas companies being alert to—and sophisticated about—creating workplaces that by their very nature are conducive to learning.

That's the main lesson learned from a study conducted for Australia's National Centre for Vocational Education Research (NCVER). The study report was written by Jane Figgis, with AAAJ Consulting Group, and Alf Standen of Training & Assessment Services.

Study rationale

The NCVER study was undertaken to explore ways that established workers develop advanced skills in a technically demanding industry. The driver for the study was the recognition that it is critical to develop workforces operating at the leading edge of skill and knowledge if Australian enterprises are to be globally competitive.

At the same time, the study was fashioned to understand whether the practices and policies of the Australian government's formal vocational education and training (VET) sector—which in recent years have emphasized entry-level training—apply equally to advancing the skills of experienced workers.

The oil and gas industry was chosen for study for two reasons, according to Figgis and Standen: 1) Oil and gas companies take training seriously, spending many millions of dollars each year on training, but deal with it as a proprietary matter for competitive reasons; and 2) the Australian petroleum industry has developed a new interest in connecting with the formal VET sector through its response to new industry-wide training standards.

(Following the 1998 explosion and fire at Esso Australia's Longford, Vict., gas plant that killed two workers—which the Royal Commission later blamed on Esso's failure to adequately train its employees—Australia's petroleum sector developed new incident response and emergency management competencies for its industry competency standard, the Chemical, Hydrocarbons, and Oil Refining Training Package PMA02.)

Study methodology

For their study, the researchers homed in on the oil and gas production sector, which they likened to a processing operation that has analogs in other industries. It also is an area where workers' skills and knowledge are required to reach a legal standard in line with Australia's "safety case" regime that's in place today.

Figgis and Standen then identified the key steps along the path to devel-

oping leading-edge skills in the oil and gas production sector, describing them as the three "skill transition points," from outside operator to production coordinator (Fig. 1).

The study team interviewed 50 individuals from 27 companies to gain insights into these skill transition points.

Figure 1.
Critical Steps To Leading-edge Skills For Oil/gas Production Workers

Transition Step 1	Transition Step 2	Transition Step 3
Recruitment as a process operator	**From process operator (outside) to control room operator (inside)**	**To person In charge (or offshore installation manager)**
The key to making this step is the individual's attributes, including an unwavering commitment to safety, while at the same time a willingness to question the way things are done. Recruits are usually experienced workers with a trade background and in their 30s or even 40s, the youngest being in their mid-20s.	To acquire the breadth and depth of skill and knowledge to make this step takes between 3 and 7 years of on-the-ground experience.	This is a senior supervisory role. It places new demands on a former operator in terms of managing interpersonal relationships across the facility and taking responsibility for emergency management.

Source: Figgis, J., and Standen, A., Training skilled workers: Lessons from the Oil and Gas Industry, NCVER, 2005.

"From a training point of view, the most revealing step concerning skill advancement was the second transition point—operators' gradual accumulation of expertise in the years between recruitment and permanently stepping into the control room," Figgis and Standen wrote in their report *Training skilled workers: Lessons from the oil and gas industry* (available through NCVER at http://www.ncver.edu.au). "This is fundamentally a story of acquiring expertise through experiential learning and provides some insight into that elusive phenomenon."

The authors contend that technical difficulty is not a significant barrier to learning and that the difference between an operator taking 3 years or 7 to gain this expertise is due to the employee's personal inclination—and not the employee's failure to learn or the employer's failure to teach. In short, it is the individual worker who tends to play the crucial role in determining whether training is taken up, not the employer.

Figgis and Standen cite these factors as crucial for enabling production operators to develop advanced skills through work:

- Expectation. Operators are told upon recruitment that there were chosen because they were perceived to have both the aptitude and attitude to master the required skills.
- Challenge. Operators recognize and appreciate high-quality training.
- Continuity of practice. Operators are imbued with the importance of asking questions about what they are doing and what they see others around them doing.
- Targeted training. Formal training is still important in technically difficult areas.

Findings

The operators and supervisors who work in oil and gas production have two main responsibilities: first, safety; second, meeting production targets.

"The skill of installation operators and managers, then, lies in responding to upsets, maintaining and fixing equipment, keeping flow within optimum parameters, and staying vigilant at all times," the authors wrote.

Given the aging of the petroleum industry workforce and the trend towards

minimum staffing, one might assume that technical competency would be the keystone to advancement in the production sector. In fact, the researchers found that attitude typically trumps technical skills in career advancement in this sector.

Figgis and Standen developed these observations about the skills transition points from their interviews and research:

- For an entry-level process operator, unlike many other industries, entry to oil and gas production is basically restricted to experienced workers: "Recruits to process operations have typically worked elsewhere for at least 5 or 10 years ...The youngest are in their mid-20s, but often people enter the industry in their 30s and even 40s. There are real and important barriers to achieving this entry step." The authors conclude that entry into the production sector hinges more on aptitude and attitude than on technical qualifications. In a paradoxical way, the industry "wants individuals who are willing to carry out their tasks precisely and yet retain a questioning frame of mind and confidently experiment when problems arise. Operators need to be team players and capable loners. They must want to go on learning long after they have mastered routine operations."
- In the transition from outside process operator to inside panel operator, it takes usually 3-7 years: "The skill and knowledge acquired through those years of experience constitute a very gradual but nonetheless identifiable skill transition point. However, the term 'point' is possibly misleading; in some ways, the process is more like a balloon which slowly inflates." This process is described by interview respondents as an almost mystical process, getting a gut feel for how the signals on a computer screen relate specifically to outside equipment. This underscores the researchers' finding that skill transition points "are more often a gradual integration of insight and expertise than the acquisition of a specific, discrete competency." Accordingly, it is critical to maintain a work environment that is stimulating to operators even after they have mastered routines. The lessons that move a novice process operator into the control room show that informal—but intentional—learning is mixed with formal training, with both channeled to a clear goal. This is accomplished through initial formal induction, workplace supervision, on-the-job training, constant reinforcement, mentoring, and project assignments.
- In the final transition, from control room operator to production coordinator/installation manager, this move is seen "as a 'steep step,' since broad managerial skills are required, as well as a significantly extended set of incident response and emergency management competencies."

One gap the researchers found in process operators' workplace education is a lack of thorough understanding of the phase properties of a well stream: "The problem is that isn't possible to get an intuitive understanding of this by observing and tinkering—the fluids stay quite invisible, hidden away in pipes."

Another concern is the intermittent nature of employment in the oil and gas industry, which has "serious implications for skill development and, importantly, skill maintenance." However, just because so much of the learning in such situations seems opportunistic, that does not mean it isn't recognized.

Even without agreement on worker competency certification, individual companies do a good job of keeping track of their workers' capabilities—increasingly through computerized learning management systems.

Figgis and Standen also found shortcomings in the ways production supervisors are enabled to develop effective skills for managing people; for acting as a fair, two-way conduit between the home office and field workers; and for managing emergencies.

Study implications

One of two chief implications of the researchers' study for advancing skills development in the oil and gas producing sector is the need for underpinning knowledge with technical instruction—for example, a thorough understanding of chemical and physical processes that the fluid mixtures are undergoing as they move via production tubing, flowlines, and installation piping.

A downside of reliance on experiential learning, this shortfall needs to be addressed by instilling the relevant scientific and technical knowledge through "astute instructional design and delivery."

The other major implication for the oil and gas production industry is the need for cooperation among oil and gas companies in the development of leading-edge skills.

"A significant feature of oil and gas producers is the extent to which each sees itself as exceptional—as different from (and usually above) the norm," Figgis and Standen wrote.

This attitude stems from two factors: the individual nature of each hydrocarbon field development and the significant differences in corporate cultures.

"This study has revealed that, from a skills development point of view, these perceived differences are largely illusionary," the authors concluded. They found that workers' transition points, developmental pathways, and organizational approaches to meet skill development needs are almost identical—regardless of company size or direct employment vs. subcontractor status.

However, industry seems to be moving toward cooperation on skills development. The researchers noted that the development of Training Package

Table 1
Learning-Conducive Conditions Of Work

High degree of exposure to change	Degree to which employees are exposed to changes in the form of new technology and new work methods.
High degree of exposure to demands	Degree to which employees are exposed to demands from customers, management, colleagues or group/network.
Managerial responsibility	Degree of managerial responsibility in the job.
External professional contact	Degree of opportunity to participate in professional forums outside the company, conferences, trade fairs etc.; contacts with suppliers and customers.
Direct feedback	Degree of opportunity to learn through seeing direct result of one's own work.
Management support for learning	Degree to which the individual employee experiences support and encouragement for learning from management.
Rewarding of proficiency	Degree of direct and indirect rewarding of increased productivity at work.

Source: Figgis, Standen after (ANTA 2003c, p.10).

PMA02 has established a uniform set of competencies that the industry helped design and supports. Also, the establishment of Australia's safety case regime commits oil and gas companies to regular, detailed evaluations of safety and emergency management competence. And the growing shortage of skilled operators and controllers is spurring an industry-wide approach to establishing an industry-wide apprenticeship program for process operators.

Conclusions

Figgis and Standen offer a number of key conclusions from their study, among them:

- "A lack of engagement with the [formal VET] sector is something the oil and gas producing sector might reflect on.
- "Workers' attitudes are key in developing a high-performance/high-skill workforce. Commitment to safety, a willingness to question and learn are attitudes required to be recruited to the oil and gas industry. They are non-negotiable. VET providers working with candidates at entry level need to understand that developing appropriate attitudes in students is as important as their acquiring specialist skill and knowledge.
- "Skilled workers are different from entry-level learners in that, on the whole, they are far more confident learners and, in this industry, thrive on challenge. In a workplace that affords them the opportunities, they effectively take charge of their own learning program; they act like the autonomous professionals they are. This is a reminder that VET produces professional workers in the true sense of the word.
- "Advanced skill learners reported requiring training with 'bite'... This requires thoughtful instruction design where the trainer perceptively judges the degree of challenge ('bite') in light of each worker's capacity to meet the challenge.
- "Enterprises ought to conceptualize the workplace as a learning environment, as well as the site where products/services are created. Learning environments are characterized by the tasks people are given, the resources at their disposal to complete the tasks, and the support offered. Experience suggests that it is of real benefit for employers to envisage their workplaces in terms of this trio of learning 'affordances' and observe the quality of the learning that emerges."

Figgis and Standen point to recent Norwegian research that produced a chart of learning-conducive conditions of work, which is reproduced in the accompanying table. The researchers contend that this list needs further refinement.

"For example," they wrote, "it implies that the employer does all of the 'affording' of learning, but this study demonstrates the ways many employees design learning situations for themselves—so 'autonomy' may be another conducive condition for learning.

"Likewise, 'trust' is not mentioned, but operators asking tough questions is central to workplace learning and critically depends on trust." ◊

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Deputy Construction Manager
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Perth
Job ID: 4714551

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Multiple Locations
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Construction & Facilities
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Job ID: 4759481

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Job ID: 3509503

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Civil Construction Engineer
G.A.S. Unlimited, Inc
Multiple Locations
Job ID: 3821424

Civil Engineer
G.A.S. Unlimited, Inc
Multiple Locations
Job ID: 1832061

Civil Engineer (Pipeline)
Sunoco Logistics
Sugar Land, TX
Job ID: 4435983

Civil/Structual Engineer
Chevron
Multiple Locations
Job ID: 4485359C02

Civil/Structural Engineer
Canadian Natural Resources Limited
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Job ID: 2616081

Completion Fluids Engineering Specialist
Chevron
Houston, TX
Job ID: 4759082

Completions Engineer
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Multiple Locations
Job ID: 4441652

Completions Engineer
Subsurface Consultants & Associates, LLC
Houston, TX
Job ID: 3085332

Compressor Engineer
J P Kenny
London
Job ID: 4714503

Consulting Engineer
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Multiple Locations
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Control Systems Designer
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Early Concept Development Engineer
Chevron
Multiple Locations
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Job ID: 3539374

Electrical Designer
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Job ID: 2531259

Electrical Engineer
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Electrical Engineer
Chevron
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Job ID: 4529927

Electrical Engineer
J P Kenny
India Hook
Job ID: 4714515

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G.A.S. Unlimited, Inc
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Electrical Physical Layout Designer
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Multiple Locations
Job ID:2166991

Engineering Geologist
J P Kenny
India Hook
Job ID: 4714522

Engineering Manager
G.A.S. Unlimited, Inc
Multiple Locations
Job ID:1832199

Engineering Manager
UOP LLC
Anaheim, CA
Job ID:4658374

Environmental Engineer
Shell Exploration and Production Inc
Multiple Locations
Job ID:4570015

Environmental Engineer/Scientist
Chevron
Multiple Locations
Job ID:4792235

Equipment Engineer
UOP LLC
Job ID:4703779

Ethylene Engineers
G.A.S. Unlimited, Inc
Houston, TX
Job ID: 3205509

Facilities Engineer
Chevron
Houston, TX
Job ID:4826790

Facilities Engineer
G.A.S. Unlimited, Inc
Multiple Locations
Job ID:2336083

Facilities Engineer
Subsurface Consultants & Associates, LLC
Houston, TX
Job ID:2432189

Field Piping Designer
G.A.S. Unlimited, Inc
Texas City, TX
Job ID:3509499

Field Process Engineer
G.A.S. Unlimited, Inc
San Leon, TX
Job ID:3949548

Finite Element Engineer
J P Kenny
London
Job ID: 4714498

Flexibles Design Engineer
J P Kenny
Job ID: 4714493

Flowline Design Engineer
J P Kenny
Aberdeen
Job ID: 4714521

Fluid Systems Process Engineer
G.A.S. Unlimited, Inc
Houston, TX
Job ID: 2074109

Front End Engineer
Brunei Shell Petroleum Company Sendirian Berhad
Seria
Job ID: 4708673

General Mechanical Engineer
G.A.S. Unlimited, Inc
Multiple Locations
Job ID: 4442697

Geotechnical Engineer
G.A.S. Unlimited, Inc
Houston, TX
Job ID: 3046665

Geotechnical Engineer
SMEP
Kuala Lumpur
Job ID: 4570019

Geotechnical Engineers-Offshore
J P Kenny
London
Job ID:4714527

Heat Exchanger Engineer
G.A.S. Unlimited, Inc
Multiple Locations
Job ID:4485443

Hydraulic Engineer
G.A.S. Unlimited, Inc
Houston, TX
Job ID:3392848

Hydraulics Engineer
Chevron
Bellaire, TX
Job ID:4867009

Instrument Designer
G.A.S. Unlimited, Inc
Houston, TX
Job ID: 3949543

Instrumentation and Control Engineer
Canadian Natural Resources Limited
Multiple Locations
Job ID: 2686649

Integrity Engineering
J P Kenny
Multiple Locations
Job ID: 4714516

Intelligent Pigging Engineer
J P Kenny
Aberdeen
Job ID: 4714481

Interface Engineer
J P Kenny
Aberdeen
Job ID: 4714549

Interface Manager Subsea
G.A.S. Unlimited, Inc
Houston, TX
Job ID: 1831849

LNG Process Engineer
Chevron
Houston, TX
Job ID: 4866939

Logistics and Interface Coordinator
Canadian Natural Resources Limited
Calgary, AB
Job ID: 4316660

Manufacturing Engineer/Industrial Engineer
G.A.S. Unlimited, Inc
Manitowoc, WI
Job ID: 3046675

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Materials & Corrosion Engineer
Canadian Natural Resources Limited
Calgary, AB
Job ID: 2908465

Materials and Corrosion Engineer
Chevron
Multiple Locations
Job ID: 4792146

Materials Engineer
J P Kenny
Aberdeen
Job ID: 4714557

Mechanical - Fixed Equipment Engineer
Chevron
Multiple Locations
Job ID: 4826857

Mechanical - Rotating Engineer
Chevron
Multiple Locations
Job ID: 4792136

Mechanical Design Engineer
UOP LLC
Des Plaines, IL
Job ID: 4726032

Mechanical Engineer
Canadian Natural Resources Limited
Multiple Locations
Job ID: 4316687

Mechanical Engineer
G.A.S. Unlimited, Inc
Multiple Locations
Job ID: 2767057

Mechanical Engineer
J P Kenny
Job ID: 4714547

Metering Engineer
J P Kenny
Aberdeen
Job ID: 4714483

Midlevel Structural Engineers
G.A.S. Unlimited, Inc
Chicago, IL
Job ID: 1832190

Offshore Engineer
G.A.S. Unlimited, Inc
Multiple Locations
Job ID: 4070443

Offshore Pipeline Engineers
J P Kenny
Multiple Locations
Job ID: 4714526

Oils Planning Engineer
Chevron
Multiple Locations
Job ID: 4866835

P&ID Designer PDMS
G.A.S. Unlimited, Inc
Houston, TX
Job ID: 3539382

Packaging Equipment Engineer
G.A.S. Unlimited, Inc
Houston, TX
Job ID: 2493990

PDMS Piping Designer
G.A.S. Unlimited, Inc
Multiple Locations
Job ID: 4832961

Petroleum Engineer
Aramco Services
Multiple Locations
Job ID: 3969792

Pipe Spec. Engineers
G.A.S. Unlimited, Inc
Multiple Locations
Job ID: 2847682

Pipeline Integrity Engineer
G.A.S. Unlimited, Inc
San Antonio, TX
Job ID: 1832200

Pipeline Project Engineer Houston
G.A.S. Unlimited, Inc
Houston, TX
Job ID: 4442686

Piping Designer
G.A.S. Unlimited, Inc
Multiple Locations
Job ID: 2746722

Piping Engineer
Aramco Services
Job ID: 4800893

Piping Stress Engineer
G.A.S. Unlimited, Inc
Houston, TX
Job ID: 2910445

Piping/Valve Specialist
Chevron
Houston, TX
Job ID: 4792262

Pressure Vessel Design Engineer
G.A.S. Unlimited, Inc
Multiple Locations
Job ID: 4317559

Principal Catalyst Scientist
UOP LLC
Des Plaines, IL
Job ID: 3433599

Principal Designer
G.A.S. Unlimited, Inc
Multiple Locations
Job ID: 3392911

Process Engineer
UOP LLC
Multiple Locations
Job ID: 3433583

Process Engineer
Canadian Natural Resources Limited
Multiple Locations
Job ID: 4316673

Process Technical Advisor
UOP LLC
Des Plaines, IL
Job ID: 4887008

Product Engineer
Siemens
Columbus, OH
Job ID: 4726184

Production & Facilities Engineer
Aramco Services
Multiple Locations
Job ID: 4800906

Production Engineer
Canadian Natural Resources Limited
Multiple Locations
Job ID: 4316690

Production Engineer
Chevron
Multiple Locations
Job ID: 4792314

Regional Project Controls Manager
G.A.S. Unlimited, Inc
Denver, CO
Job ID: 2336084

Reliability & Risk Engineer
J P Kenny
Aberdeen
Job ID: 4714508

Reliability Engineer
Chevron
Multiple Locations
Job ID: 4792103

Renewable Energy Development Specialist
UOP LLC
Des Plaines, IL
Job ID: 4887009

Reserves Engineer
G.A.S. Unlimited, Inc
Multiple Locations
Job ID: 4070442

Reserves Engineer
Hilcorp Energy Company
Houston, TX
Job ID: 3566030

Reservoir Engineer
Aramco Services
Job ID: 3969804

Resident Field Engineer
UOP LLC
Des Plaines, IL
Job ID: 4811128

Riser Engineer
J P Kenny
Perth
Job ID: 4714505

Risk Engineer
Canadian Natural Resources Limited
Calgary, AB
Job ID: 4316679

Risk Engineer
Magellan Midstream Partners, L.P.
Tulsa, OK
Job ID: 4266503

Rotating Equipment Engineer
G.A.S. Unlimited, Inc
Multiple Locations
Job ID: 2820927

Rotating Equiptment Engineer
G.A.S. Unlimited, Inc Beaumont, TX
Job ID: 3235597

Senior Corrosion Engineer
J P Kenny
London
Job ID: 4714531

Senior Cost Engineer
G.A.S. Unlimited, Inc
Multiple Locations
Job ID: 4485430

Senior Design Engineer
J P Kenny
Aberdeen
Job ID: 4714494

Senior Design Engineer Control Systems
G.A.S. Unlimited, Inc
Sugar Land, TX
Job ID: 3392872

Senior Electrical Designer
G.A.S. Unlimited, Inc
Multiple Locations
Job ID: 3174589

Senior Engineers Integrity/Asset Mgt
J P Kenny
Job ID: 4714548

Senior Inspection Engineer
J P Kenny
Multiple Locations
Job ID: 4714530

Senior Process Design Engineer
Brunei Shell Petroleum Company Sendirian Berhad
Seria
Job ID: 4708670

Senior Process Engineer
Holcim (US), Inc.
Clarksville, MO
Job ID: 4538416

Senior Scheduling Engineer
G.A.S. Unlimited, Inc
Houston, TX
Job ID: 2595770

Senior Structural Engineer
G.A.S. Unlimited, Inc
Houston, TX
Job ID: 1831817

SIS Lead Engineer
G.A.S. Unlimited, Inc
Houston, TX
Job ID: 4832957

Slurry Engineer
Chevron
Richmond, CA
Job ID: 4866862

Staff Evaluation Engineer
Subsurface Consultants & Associates, LLC
Houston, TX
Job ID: 2756384

Staff Production Engineer
Subsurface Consultants & Associates, LLC
Houston, TX
Job ID: 2432186

Stress Analyst III
G.A.S. Unlimited, Inc
Houston, TX
Job ID: 1831842

Subsea Controls Systems Engineer
J P Kenny
Multiple Locations
Job ID: 4714554

Subsea Intervention Engineer
Chevron
Multiple Locations
Job ID: 4867031

Subsea Pipeline Engineer
Chevron
Multiple Locations
Job ID: 4866940

Subsea Pipeline Engineer
J P Kenny
Multiple Locations
Job ID: 4714490

Subsea Systems Engineers
G.A.S. Unlimited, Inc
Houston, TX
Job ID: 2493995

Subsea Tree Engineer
Chevron
Multiple Locations
Job ID: 4866874

Supervising Discipline Engineer
G.A.S. Unlimited, Inc
Multiple Locations
Job ID: 3509493

Supervising Process Engineers
G.A.S. Unlimited, Inc
Martinez, CA
Job ID: 4317531

Transmission Engineer
G.A.S. Unlimited, Inc
Houston, TX
Job ID: 3260839

Trees Engineering
J P Kenny
Aberdeen
Job ID: 4714486

Value Engineering Specialist
Aramco Services
Job ID: 4800892

Vessel Engineer
G.A.S. Unlimited, Inc
Multiple Locations
Job ID: 4288211

Well Completion Supervisor
Subsurface Consultants & Associates, LLC
Job ID: 3057898

Well Engineering
Subsurface Consultants & Associates, LLC
Job ID: 3057897

Field Operations

Control Room Operator
Canadian Natural Resources Limited
Calgary, AB
Job ID: 3660999

Drilling Foreman
Aramco Services
Multiple Locations
Job ID: 3969375

Drilling Supervisor
Aramco Services
Multiple Locations
Job ID: 3969788

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Drilling Supervisors
Brunei Shell Petroleum Company Sendirian Berhad
Seria
Job ID: 4708671

Electrical Field Engineer
G.A.S. Unlimited, Inc Hamilton, NJ
Job ID: 3392907

Field Operator - Ore Preparation and Extraction
Canadian Natural Resources Limited
Calgary, AB
Job ID: 2349041

Field Service Engineer
Siemens
Multiple Locations
Job ID: 4826425

Field Service Technician
G.A.S. Unlimited, Inc
Multiple Locations
Job ID: 3949552

Field Services Technician
Service & Maintenance
Ashland, MS
Job ID:4790638

Fieldman/Trainee
Chevron
Bakersfield, CA
Job ID: 4758984

Land Surveyors
G.A.S. Unlimited, Inc
Fort Worth Corpus, TX
Job ID: 3509517

Mapper
G.A.S. Unlimited, Inc
Houston, TX
Job ID: 4288210

Operations Leader
UOP LLC
Multiple Locations
Job ID:3433578

Production Technician
UOP LLC
Chickasaw, AL
Job ID:4132059

Senior Tank Farm Operator
Canadian Natural Resources Limited
Calgary, AB
Job ID: 2349056

Sr. Field Service Tech
Cameron
Port Allen, LA
Job ID: 4822401

Plant Manager
UOP LLC
McCook, IL
Job ID: 3433587

Plant Operators
Canadian Natural Resources Limited
Calgary, AB
Job ID: 2349072

Health & Safety

Field Safety Coordinator
Chevron
Richmond, CA
Job ID: 4866927

Health & Safety Specialist
Sunoco Logistics
Multiple Locations
Job ID: 4435252

Health and Safety Manager - Convent
Motiva Enterprises Llc
Convent, LA
Job ID:4767456

HSE Advisor
Shell Exploration & Production Company
Multiple Locations
Job ID:4570018

HSE Trainer
G.A.S. Unlimited, Inc
Houston, TX
Job ID: 2364438

Industrial Hygienist
Canadian Natural Resources Limited
Calgary, AB
Job ID: 4287327

Safety, Risk and Reliability Analyst
G.A.S. Unlimited, Inc
Houston, TX
Job ID: 3392847

Team Lead Emergency Management
Chevron
San Ramon, CA
Job ID: 4866888

Human Resources

Director, HR Projects & Planning
Chevron
San Ramon, CA
Job ID: 4530217

HR Director
Chevron
Multiple Locations
Job ID: 4792121

HR Manager
UOP LLC
Des Plaines, IL
Job ID: 4703778

Human Resources Recruiter
Canadian Natural Resources Limited
Calgary, AB
Job ID: 2349032

Labour Relations Advisor
Canadian Natural Resources Limited
Calgary, AB
Job ID: 4441567

Trainer - Mine Operations
Canadian Natural Resources Limited
Calgary, AB
Job ID: 4485225

Project Management

Field Senior Project Planner
G.A.S. Unlimited, Inc Morgantown, MA
Job ID: 3174580

Program Manager
Balboni, Buchanan & Associates LLC
Central, FL
Job ID: 4272918

Project Estimator
G.A.S. Unlimited, Inc
Houston, TX
Job ID: 3451875

Project Management Specialist
Siemens
Orlando, FL
Job ID: 3295663

Project Manager
Cameron
Houston, TX
Job ID: 4201799

Project Manager - Utility Construction
Synthetic Materials
La Plata, MD
Job ID: 4824550

Project Safety Manager
G.A.S. Unlimited, Inc
Monrovia, CA
Job ID: 4317533

Senior Planner/Schedulers
G.A.S. Unlimited, Inc
Houston, TX
Job ID:4714473

Subsea Project Managers
G.A.S. Unlimited, Inc
Houston, TX
Job ID:2866260

Sales & Marketing

Account Manager
Cameron
Multiple Locations
Job ID: 3671409

Manager Marketing
Shell Trading Services Company
Chicago, IL
Job ID: 4570013

Market Service Rep
Cameron
Houston, TX
Job ID: 4729993

Marketing Consultant Devlp Mgr
Siemens
Houston, TX
Job ID: 3295461

Marketing Manager
Cameron
Houston, TX
Job ID: 4230320

Sales Manager
Siemens
Austin, TX
Job ID: 4821177

Sales Specialist
UOP LLC
Houston, TX
Job ID: 4811131

Territory Manager
G.A.S. Unlimited, Inc
Saint Johns, NL
Job ID: 1832040

Science

Earth Scientist
Chevron
Multiple Locations
Job ID: 4564446

Exploration Geologist
Subsurface Consultants & Associates, LLC
Houston, TX
Job ID: 2942882

Geological Technician
Shell International Exploration and Production Inc
Houston, TX
Job ID: 4650496

Geologist
Canadian Natural Resources Limited
Multiple Locations
Job ID: 2616089

Geologist
Chevron
Kemmerer, WY
Job ID: 4792306

Geologist
G.A.S. Unlimited, Inc
Houston, TX
Job ID: 4244925

Geologist
Subsurface Consultants & Associates, LLC
Multiple Locations
Job ID: 4156412

Geophysicist
Subsurface Consultants & Associates, LLC
Multiple Locations
Job ID: 2444499

Geoscientist
Chevron
Houston, TX
Job ID: 4866968

Mine Geologist
Canadian Natural Resources Limited
Calgary, AB
Job ID: 4144962

Petrologist
Subsurface Consultants & Associates, LLC
Houston, TX
Job ID: 2476068

Petrophysicist
Aramco Services
Job ID: 4800904

Petrophysicists
Brunei Shell Petroleum Company Sendirian Berhad
Seria
Job ID: 4708675

Petrophysics Team Leader
Shell Exploration & Production Company
Houston, TX
Job ID: 4874242

Sr. Development Geologist
Subsurface Consultants & Associates, LLC
Houston, TX
Job ID: 4132054

Sr. Exploration Geologist
Subsurface Consultants & Associates, LLC
Houston/Westside, TX
Job ID: 929508

Sr. Staff Geophysicist
Subsurface Consultants & Associates, LLC
Houston, TX
Job ID: 4132057

Structural Geologist
Subsurface Consultants & Associates, LLC
Houston/West, TX
Job ID: 4132056

Western Geological Advisor
Subsurface Consultants & Associates, LLC
Multiple Locations
Job ID: 3057906

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Sales Index

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Account Executive;
Recruitment Advertising
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Account Executive;
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tracyt@pennwell.com
fax 877.801.2031

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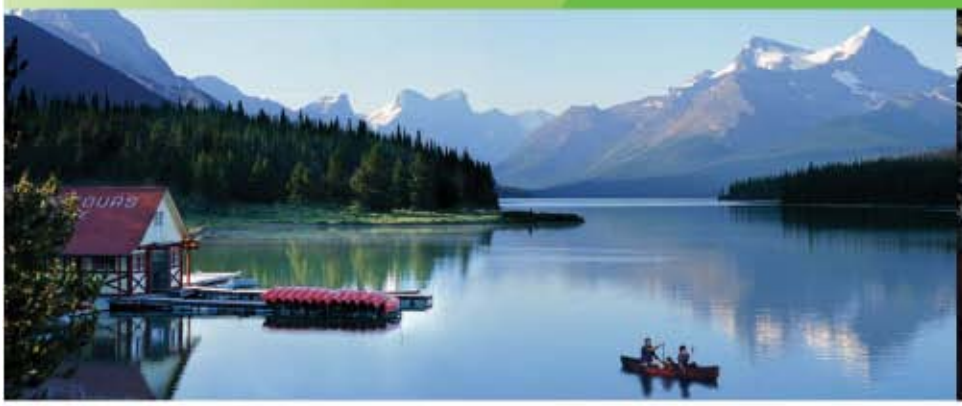

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